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# REPORT

OF THE

# SECRETARY OF WAR;

BEING PART OF

THE MESSAGE AND DOCUMENTS

COMMUNICATED TO THE

TWO HOUSES OF CONGRESS

AT THE

BEGINNING OF THE SECOND SESSION OF THE FIFTIETH CONGRESS.

IN FOUR VOLUMES.

VOLUME III.

WASHINGTON:
GOVERNMENT PRINTING OFFICE.
1888.

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# REPORT OF THE CHIEF OF ORDNANCE.

WAR DEPARTMENT, ORDNANCE OFFICE,
*Washington, September* 1, 1888.

SIR: I have the honor to submit the following report of the principal operations of the Ordnance Department during the fiscal year ended June 30, 1888, with such remarks and recommendations as the interests of this branch of the military service seem to require.

The fiscal resources and expenditures of the department during the year were as follows, viz:

| | |
|---|---|
| Amount in the Treasury to the credit of the appropriations on June 30, 1887 | $233,969.33 |
| Amount in the Treasury not reported to the credit of the appropriations on June 30, 1887 | 4,761.50 |
| Amount in Government depositories to the credit of disbursing officers and others on June 30, 1887 | 209,356.34 |
| Amount of appropriations for the service of the fiscal year ended June 30, 1888 | 1,541,097.75 |
| Amounts refunded to ordnance appropriations in settling accounts during the fiscal year ended June 30, 1888 | 278.03 |
| Gross amount received during the fiscal year ended June 30, 1888, from sales to officers; from rents; from collections from troops on account of losses of, or damage to, ordnance stores; from Chicago, Rock Island and Pacific Railroad Company; from powder and projectiles (proceeds of sales); from sales of condemned stores; from testing machine, and from all other sources not before mentioned | 50,706.55 |
| Total | 2,040,169.50 |
| Amount of expenditures during the fiscal year ended June 30, 1888, including expenses attending sales of condemned stores, exchange of powder, etc | 1,507,382.37 |
| Amount deposited in Treasury during the fiscal year ended June 30, 1888, as proceeds of sales of Government property | 21,141.38 |
| Amount turned into the "surplus fund" on June 30, 1888 | 5,290.47 |
| Amount in Government depositories to the credit of disbursing officers and others on June 30, 1888 | 157,850.89 |
| Amount transferred from ordnance appropriations in settling accounts during the fiscal year ended June 30, 1888 | 5,709.34 |
| Amount in the Treasury not reported to the credit of appropriations on June 30, 1888 | 1,020.48 |
| Amount in the Treasury to the credit of appropriations on June 30, 1888 | 341,774.57 |
| Total | 2,040,169.50 |

## STATIONS AND DUTIES.

The stations and duties of the officers of the Ordnance Department are as follows: Five at the Ordnance Office; thirty-five at the arsenals, armory, and powder depots; nine on the Ordnance Board and at the foundries; six at the several military headquarters and ordnance depots; two at the Military Academy; one under the orders of the Secretary of the Interior; one in the Life-Saving Service, under the Secretary of the Treasury.

The Ordnance Department provides the armament for our sea coast defenses, and arms and other ordnance stores for the Army, the militia, the Marine Corps, all other Executive Departments to protect public money and property, and the colleges authorized by law to receive them for instruction.

## SMALL-ARMS.

During the fiscal year ended June 30, 1888, 41,130 rifles and carbines have been manufactured at the National Armory. Repairing arms, providing spare parts, making swords, sabers, and miscellaneous articles must be mentioned among its operations.

During the past year the investigations have been completed relative to the determination of the charge and projectile, rifling, chamber, etc., for an arm of smaller caliber than the present service piece. It is the intention to use compressed and perforated cartridges, but as yet the powder makers have not succeeded in producing a satisfactory powder, the desired velocity being accompanied by too great a pressure. This matter of a suitable powder is still under study and trial. The results obtained in France with the Lebel rifle seem to point to a radical innovation in the manufacture of powder for small-arms.

## COLUMBIA ARSENAL.

During the present session of Congress a law was passed (approved May 1, 1888) authorizing "the construction of an arsenal for the repair, storage, and distribution of ordnance and ordnance stores for the use of the Government of the United States, at Columbia, Tenn.," and appropriating $200,000 for its establishment. The law provides that without cost to the United States not less than 50 acres of suitable land is to be conveyed in fee to the United States, and that exclusive jurisdiction over said land by the United States Government is ceded by the State of Tennessee. A tract of land covering about 70 acres immediately outside the city limits has been thoroughly examined and accepted and the title to the same is now being investigated by the Department of Justice. As soon as these provisions of law have been complied with, steps will at once be taken to construct the arsenal.

## PROCURING SUPPLIES.

All ordnance supplies are to be procured after due advertisement and competitive bidding, under section 3709, Revised Statutes. But there are cases constantly occurring at our manufacturing establishments where small supplies are required, and under the present system of advertising for proposals experience has shown that such purchases entail loss upon the Government by reason of the higher prices asked when sealed proposals are required as well as the general disinclination of dealers and manufacturers to go through the formality of competitive bidding for small purchases, to say nothing of the additional loss by the consequent delay in this mode of purchase. I refer now to the minor supplies, the necessity for which can not be economically anticipated.

To meet such cases, and in the interest of a true public economy, I would recommend that section 3709, Revised Statutes, be amended by inserting after the word "services" on the first line the words "in excess of two hundred dollars," so that the section shall then read:

> SEC. 3709. All purchases and contracts for supplies or services *in excess of two hundred dollars*, in any of the Departments of the Government, except for personal services, shall be made by advertising a sufficient time previously for proposals respecting the same, when the public exigencies do not require the immediate delivery of the articles or performance of the service. When immediate delivery or performance is required by the public exigency, the articles or service required may be procured by open purchase or contract, at the places and in the manner in which such articles are usually bought and sold, or such services engaged between individuals.

The Interior Department makes purchases in open market to the amount of $500, under existing law.

### ARMAMENT OF FORTIFICATIONS.

No regular appropriation has been available for this purpose during the past fiscal year. The Department has been enabled, however, by means of the small permanent appropriation accruing from the proceeds of sales of unserviceable and obsolete material, to proceed with the manufacture of one 8-inch B. L. gun, composed entirely of American steel; of one 10-inch B. L. gun, of which the tube, jacket, and trunnion-hoop were obtained in England, and twenty-five 3.2-inch steel field guns. These guns are all under manufacture at the Watervliet Arsenal, West Troy, N. Y., and should be completed during the coming winter. The gun plant at this arsenal was established last year in pursuance of the recommendations of a board of ordnance officers convened by the Secretary of War for the purpose of selecting a suitable site for a gun factory, with a view to concentrating there the available gun machinery on hand in the Department. One of the large timber store-houses at this arsenal—a two-story brick building, 392 feet by 50 feet, and which cost $19,860—was deemed suitable for the purpose of a gun-shop. This building is located close to the site selected by the Gun Foundry Board. The timber was removed, a shrinking-pit excavated in the rock, and suitable foundations for the machines and floors and a railway track laid, all at an expense of about $20,000. The machines and tools taken from other arsenals, notably from the

Watertown Arsenal, and a large gun-lathe from the South Boston foundry, were set up in this building. The value of the machinery is estimated at about $50,000, though much of it is adapted only to the manufacture of smaller calibers, as field-guns, and most of it is more or less worn. The present capacity of the establishment is about 50 field-guns, and one 8-inch and one 10 inch gun per annum. Work was actively begun in this shop last November, the installation of the plant having been pushed to completion with unflagging energy and zeal by the commanding officer, Colonel Whittemore, and the ordnance officers on duty as his assistants. Estimates have been submitted to complete this plant so as to make type guns of 12-inch caliber, and to increase the present facilities for handling the work and for moving and shipping guns. In the event of Congress making an appropriation for a gun factory at this point, the present shop, with the smaller tools, would be devoted to the manufacture of field and siege guns.

## TESTS OF ORDNANCE.

The firing of the 8-inch B. L. gun has been continued during the past year as rapidly as it was possible to procure suitable powders and as other important work would permit. Much delay has occurred from the failure of the powder makers to reproduce or duplicate powders which had been accepted as satisfactory. The gun has been fired 203 rounds, and is in a sound and serviceable condition. This firing has produced light but distinctly visible erosion marks on the front slope of the powder chamber, the shot chamber, and the bottom of the rifled bore. The firing will be continued until the endurance is thoroughly tested. Experience indicates that the erosion increases rapidly as the pressures increase, and the pressures during the test of this 8-inch gun have averaged over 16 tons, and reached as high as 22 tons per square inch of powder chamber. The gun is in the hands of the Board for Testing Rifled Cannon and Projectiles, and its report will be rendered during the coming year.

## THE 12-INCH B. L. RIFLED MORTAR, CAST-IRON, HOOPED WITH STEEL.

This piece has been subjected to preliminary firings by the Ordnance Board, with the object of determining suitable kinds and weights of charge, in order to cover all ranges from 1 to 6 miles, without exceeding the prescribed limit of pressure and to ascertain the best form of banding for the projectiles. These firings are not yet completed, and the results thus far obtained can hardly be accepted as fully representative of the best that is to be expected from this piece. In all about 193 rounds have been fired, of which 78 rounds were with charges of from 50 to 80 pounds, with an average pressure of about 28,000 pounds, but reaching as high as 33,000 pounds per square inch. The maximum charge is not less than 80 pounds brown prismatic powder; density of loading, 1.113; weight of shell, 630 pounds; maximum velocity, 1,152 feet; energy, 5,796 foot-tons. The range attained with this charge and weight of shell under an angle of 45° was 10,480 yards, or 5.95 miles. It is the intention to subject the mortar to a fire of endurance of not less than 400 rounds, of which 200 shall be with the maximum charge, or in which the pressure shall be a maximum. It is also the intention to use a stronger powder for the maximum charge, so as to give a pressure of about 30,000 pounds, with the attainment of a velocity of about 1,175 feet. The present mounting of the mortar, as regards both carriage and platform, is so unsatisfactory that the firings for accuracy at long range will have to be postponed until at least a new platform can be laid. No firings for rapidity have as yet been made, and at this date it may be said that the accuracy of fire, endurance, and power are not definitely determined except as to the minimum limit.

## 5-INCH B. L. SIEGE RIFLE.

Preliminary firings have been made with this piece to determine the kind and charge of powder. The following ballistic results have been obtained:

| Powder. | | Density of loading. | Weight of projectile. | Muzzle velocity. | Pressure per square inch of powder chamber. | Muzzle. energy. |
|---|---|---|---|---|---|---|
| Kind. | Weight. | | | | | |
| | *Pounds.* | | *Pounds.* | *Feet.* | *Pounds.* | *Ft. tons.* |
| Du Pont's sphero hexagonal, density 1.728 | 10 | 0.721 | 43 | 1,628 | 25,000 | 791 |
| | 12 | 0.805 | 43 | 1,803 | 32,050 | 969 |
| | 12.5 | 0.901 | 43 | 1,829 | 34,961 | 997 |
| Du Pont's black prismatic, density 1.800 | 14 | 1.009 | 45 | 1,860 | 35,000 | 1,079 |
| | 15 | 1.081 | 45 | 1,960 | 39,400 | 1,198 |

The black prismatic powder has not given very uniform results, as appears from comparing the firings made on different days. The weight of the 5-inch siege-gun is 3,660 pounds; length of bore, 27 calibers. The firings were made on the new steel overbank carriage, 47 rounds having been fired to June 30.

## THE 7-INCH B. L. RIFLED HOWITZER, STEEL.

The only firings with this piece have also been preliminary for the purpose of working up a suitable powder. The results obtained are as follows:

| Powder. | | Density of loading. | Weight of shell. | Initial velocity. | Pressure per square inch of powder chamber. | Muzzle energy. |
|---|---|---|---|---|---|---|
| Kind. | Weight. | | | | | |
| | *Pounds.* | | *Pounds.* | *Feet.* | *Pounds.* | *Ft. tons.* |
| L. X. B., density 1.706. Gr. 270 | 6 | 0.530 | 105 | 840 | 15,000 | 514 |
| | 7 | 0.618 | 105 | 922 | 19,275 | 619 |
| | 8 | 0.706 | 105 | 994 | 23,000 | 719 |
| | 8.5 | 0.750 | 105 | 1,038 | 25,300 | 784 |
| | 9 | 0.794 | 105 | 1,074 | 26,775 | 840 |
| | 9.25 | 0.817 | 105 | 1,093 | 28,400 | 870 |
| I. K. K., density 1.725. Gr. 200 | 9 | 0.794 | 105 | 1,027 | 23,900 | 768 |
| | 9.5 | 0.839 | 105 | 1,070 | 26,800 | 833 |
| | 9.75 | 0.861 | 105 | 1,085 | 28,200 | 857 |

This piece weighs 3,750 pounds; length of bore, 12.4 calibers. No special carriage has as yet been provided.

### 12-INCH B. L. RIFLES, CAST-IRON, TUBED, AND CAST-IRON HOOPED AND TUBED.

The manufacture of these two guns, after being suspended for nearly two years, owing to the failure of the contractors to complete them within the life-time of the appropriation, was resumed this spring, Congress having reappropriated the money to pay for them, and having also extended the contracts. The 12-inch B. L. rifle, cast-iron, hooped, and tubed, has been completed and sent to the Proving Ground; the other gun, the 12-inch B. L. rifle, cast-iron, tubed, will probably be completed by next December.

I have the honor to submit the following papers, heretofore referred to:

*Appendix* 1.—Statement of principal articles procured by fabrication during the year ended June 30, 1888.

*Appendix* 2.—Statement of principal articles procured by purchase during the year ended June 30, 1888.

*Appendix* 3.—Statement of ordnance, ordnance stores, etc., issued to the military establishment, including the national homes for soldiers of the Volunteer and Regular Army, and exclusive of the militia, during the year ended June 30, 1888.

*Appendix* 4.—Statement of ordnance, ordnance stores, etc., distributed to the militia from July 1, 1887, to June 30, 1888, under section 1667, Revised Statutes.

*Appendix* 5.—Statement of ordnance, ordnance stores, etc., distributed to colleges from July 1, 1887, to June 30, 1888, under section 1225, Revised Statutes.

*Appendix* 6.—Statement of arms and ammunition issued to the Executive Departments during the year ended June 30, 1888, under the provisions of the act of March 3, 1879.

*Appendix* 7.—Report of action taken during the year ended June 30, 1888, under the provisions of the act approved March 3, 1881.

*Appendix* 8.—Showing the stations and duties of the officers of the Ordnance Department.

*Appendix* 9.—Annual Report of the Inspector of Ordnance at Midvale Steel Works.

*Appendix* 10.—Report on the Maxim gun—2 plates.

*Appendix* 11.—Ranges, etc., of 15-inch gun—2 plates.

*Appendix* 12.—Inspecting glass for small-arms—1 plate.

I have the honor to be, very respectfully, your obedient servant,

S. V. BENÉT,
*Brigadier-General, Chief of Ordnance.*

The SECRETARY OF WAR.

# APPENDIX 1.

---

## *STATEMENT OF PRINCIPAL ARTICLES PROCURED BY FABRICATION AT THE ARSENALS DURING THE FISCAL YEAR ENDED JUNE* 30, 1888.

### CLASS I.

| | |
|---|---|
| 1 | 7-inch breech-loading steel siege howitzer. |

### CLASS II.

| | |
|---|---|
| 25 | carriages for 3.2-inch guns. |
| 1 | carriage for 5-inch siege gun. |

### CLASS III.

| | |
|---|---|
| 13 | breech-sights for 3.2-inch gun. |
| 2 | brakes, inelastic, for field carriages. |
| 2 | covers, breech and muzzle, for Hotchkiss mountain gun. |
| 6 | fuse blocks. |
| 2 | fuse wrenches. |
| 2 | gunners' haversacks. |
| 3 | gun-covers for Gatling gun. |
| 25 | gunners' reamers. |
| 13 | sets artillery harness for 2 wheel-horses. |
| 26 | sets artillery harness for 2 lead-horses. |
| 46 | harness sacks. |
| 16 | harness hooks, double. |
| 100 | lanyards. |
| 34 | muzzle or front sights for 3.2-inch gun. |
| 4 | quoins. |
| 100 | securing stakes. |
| 12 | scrapers for shells. |
| 2 | sponges and rammers for 10-pounder Parrott guns. |
| 9 | sponges and rammers for 24-pounder Coehorn mortar. |
| 44 | sponges and rammers for 3 inch rifled gun. |
| 5 | sponges and staves for 13 inch mortar. |
| 110 | thumb-stalls. |
| 1 | tompion for 3-inch rifle. |
| 12 | tompions for 15 inch guns. |
| 2 | tompions for 6-pounder gun. |
| 7 | vent covers. |
| 27 | vent pieces. |
| 4 | wiper stakes. |
| 1 | vent bushing, steel, for 3.2-inch gun. |

| | |
|---|---|
| 4 | pairs gunners' sleeves. |
| 4 | mauls. |
| 12 | pointing stakes. |
| 53 | feed guides for Gatling guns. |
| 21 | hoppers for Gatling guns. |
| 111 | feed cases for Gatling guns. |
| 1 | front sight, bronze, for 3.2-inch gun. |
| 1 | rear sight, bronze, for 3.2-inch gun. |
| 100 | paulins, 12 by 15 feet. |
| 50 | paulins, 11 by 11 feet. |

### CLASS IV.

| | |
|---|---|
| 154 | 5-inch shell for breech-loading steel rifle. |
| 150 | 7-inch shell for breech-loading steel howitzer. |

### CLASS V.

| | |
|---|---|
| 25 | 6-pounder canister, filled. |

### CLASS VI.

| | |
|---|---|
| 5,000 | Springfield carbines, caliber .45. |
| 1 | Springfield carbine, 24-inch barrel, caliber .45. |
| 35,025 | Springfield rifles, model 1884, caliber .45. |
| 1,000 | Springfield cadet rifles, caliber .45. |
| 3 | Springfield rifles, rod bayonet. |
| 100 | Springfield rifles, model 1884, caliber .45, with positive cams. |
| 1 | Springfield rifle, model 1884, caliber .45, not rifled or chambered. |
| 3 | swords, general officer's. |

### CLASS VII.

#### ARTILLERY ACCOUTERMENTS.

| | |
|---|---|
| 136 | knapsacks for light batteries. |

#### CAVALRY EQUIPMENTS.

| | |
|---|---|
| 4,953 | cartridge belts fitted for cavalry. |
| 3,000 | carbine slings. |
| 3,000 | carbine-sling swivels. |
| 2,000 | pistol holsters. |
| 2,000 | saber belts. |
| 3,000 | saber-belt plates. |
| 8 | carbine slings, "Kelton's" device. |
| 24 | metal-bound packs, "Kelton's." |
| 24 | paper-bound packs, "Kelton's." |
| 200 | pistol-pack boxes, "Kelton's." |
| 4,369 | carbine slings, altered (G. O. 73). |
| 20 | pairs saber slings. |

#### INFANTRY EQUIPMENTS.

| | |
|---|---|
| 10,105 | bayonet-scabbard bodies. |
| 6,322 | bayonet scabbards. |
| 5,000 | blanket bags. |

| | |
|---|---|
| 5,000 | pairs blanket-bag shoulder-straps. |
| 9,264 | cartridge boxes, "McKeever," pattern 1874. |
| 37 | cartridge-belt plates. |
| 10,000 | canteens. |
| 7,341 | canteen straps. |
| 6,386 | pairs coat straps. |
| 519 | frogs, sliding. |
| 5,601 | gun-slings. |
| 5,800 | haversacks. |
| 5,000 | haversack straps. |
| 17,500 | tin cups. |
| 10,434 | waist belts. |
| 10,233 | waist-belt plates. |
| 5,000 | waist-belts and plates (without loops). |
| 11,350 | meat cans. |
| 3,154 | scabbards for hunting-knives, loops enlarged. |

### APPENDAGES.

| | |
|---|---|
| 38,208 | headless-shell extractors. |
| 8,669 | screw-drivers. |
| 31,950 | wiping-rods, wooden. |
| 16 | pistol-grips, metallic. |
| 235 | pistol-grip screws. |
| 500 | cleaning-rods for shot-guns. |

### HORSE EQUIPMENTS FOR CAVALRY.

| | |
|---|---|
| 2,076 | bridles, curb, cavalry. |
| 3,265 | bridles, watering. |
| 3,000 | halters and straps. |
| 5,000 | horse brushes. |
| 1,055 | horse covers. |
| 2,000 | nose-bags. |
| 1 | saddle-bag, leather. |
| 107 | side lines. |
| 1,415 | carbine boots and straps, altered to conform to G. O. No. 73. |
| 1 | crupper. |
| 1,108 | carbine boots and straps. |
| 429 | spur-straps. |
| 179 | saddle cloths, hair. |
| 124 | saddle cloths, line officers'. |
| 16 | saddle cloths, staff officers'. |
| 7 | saddle cloths, felt. |
| 2 | housings for brigadier-generals' saddle. |

## CLASS VIII.

| | |
|---|---|
| 5,796 | blank cartridges, 3-inch gun. |
| 47 | blank cartridges, 3.2-inch gun. |
| 2,630 | blank cartridges, 6-pounder gun. |
| 3,100 | blank cartridges, 12-pounder gun. |
| 5,386,547 | rifle-ball cartridges, caliber .45, reloading. |
| 183,660 | rifle and carbine blank cartridges, caliber .45, reloading. |
| 16,000 | rifle-ball cartridges, caliber .45, reloading, solid head, 405 grain bullet. |

| | |
|---|---|
| 1,000 | carbine ball cartridges, caliber .45, reloading. |
| 240,657 | revolver blank cartridges, caliber .45, reloading. |
| 300 | paper fuses, ten seconds to the inch. |
| 75 | paper fuses, thirty seconds to the inch. |
| 700 | base fuse plugs for shells. |
| 2,484,000 | carbine bullets, caliber .45, 405 grains. |
| 4,322,100 | rifle bullets, caliber .45, 500 grains. |
| 592,700 | round balls, caliber .45. |
| 58,985 | friction primers for cannon. |
| 700 | electric primers for cannon. |
| 200 | obturator primers. |

## CLASS IX.

| | |
|---|---|
| 2 | platforms for mortars. |
| 2 | sets marking outfits. |
| 2 | marksman's buttons. |
| 50 | sets reloading tools, bench. |
| 2 | chargers. |
| 2 | wrenches, powder charger. |
| 2 | extractors, primer (pins). |
| 190 | dies, reloading and crimping. |
| 25 | priming tools. |
| 50 | punches, reloading. |
| 50 | punches, resizing. |
| 337 | dies, resizing. |
| 50 | dies, crimping. |
| 3 | gauges, length. |
| 50 | spindles, reloading. |
| 50 | spindles, resizing. |
| 1 | wrench, die. |
| 25 | priming tool spindles. |
| 2 | primer inserting tools. |
| 1 | base resizing tool. |
| 1 | reloading tool, "Morse." |
| 15 | disks, with staves. |
| 25,131,500 | pasters, black and white. |
| 119 | signal flags. |
| 72 | streamers for rifle ranges. |
| 55 | targets, "Brinton." |
| 203 | targets, "Laidley" revolving. |
| 55,523 | targets, paper. |
| 10 | targets, truck, Texas. |
| 1,295 | target frames. |
| 1 | target, sectional, "Patten's." |

## CLASS X.

| | |
|---|---|
| 28 | gas check cups, De Bange. |
| 12 | gas check pads, De Bange. |
| 1 | bottom cup of De Bange gas check |
| 12 | sets gas checks, De Bange. |
| 2 | screw studs for 3.2-inch rifle. |
| 3 | staves for marking disks. |
| 2 | spring obturators, De Bange, 15-inch rifle. |
| 50 | parts of field carriages. |

| | |
|---|---|
| 48 | poles for field or siege carriages. |
| 25 | caisson rails. |
| 4 | axle bodies. |
| 18 | foot-boards. |
| 34 | parts of field limbers. |
| 24 | bolts and nuts. |
| 20 | linchpins. |
| 2 | retraction ropes. |
| 6 | tuyere irons. |
| 50 | portable forge boxes, "Empire." |
| 1 | pair brakes for 5-inch siege carriage. |
| 29 | collars. |
| 77 | saddles. |
| 24 | brass staples for saddles. |
| 16 | saddle seats. |
| 200 | stirrup bars. |
| 5 | rammer heads, 3-inch guns. |
| 15 | sponge heads, 3-inch rifle guns. |
| 18 | sponges, 3-inch rifled guns. |
| 100 | sabots, 15-inch. |
| 1,525 | shanks for projectiles for Life-Saving Service. |
| 1,595 | stocks (wood part). |
| 269 | tips. |
| 295 | tip screws. |
| 289 | ramrod stops. |
| 182 | band springs. |
| 191 | side-screw washers. |
| 211 | butt plates. |
| 469 | butt-plate screws. |
| 6 | cover springs. |
| 6 | cover-spring screws. |
| 6 | cover friction springs. |
| 136 | stocks, complete. |
| 106 | guard plates. |
| 110 | guard bows. |
| 537 | guard-bow swivels. |
| 437 | guard-bow swivel screws. |
| 43 | guard-bow nuts. |
| 476 | triggers. |
| 60 | trigger screws. |
| 790 | guard screws. |
| 23 | rear-sight leaves. |
| 11 | rear sight leaf slides. |
| 1,279 | rear-sight screws, front and rear. |
| 31 | rear sight joint pins. |
| 2,457 | rear-sights, complete. |
| 12 | barrels. |
| 1 | receiver. |
| 5,241 | extractors. |
| 547 | hinge pins. |
| 3,895 | ejector springs. |
| 6,072 | ejector-spring spindles. |
| 126 | ejector studs. |
| 75 | cam latches. |
| 12 | breech-block caps. |
| 10 | thumb pieces. |

| | |
|---|---|
| 52 | breech blocks |
| 2,063 | breech-block cap screws. |
| 10,491 | firing pins. |
| 2,929 | firing-pin screws. |
| 1,767 | cam-latch springs. |
| 4 | breech screws. |
| 897 | front-sight cover screws. |
| 1,804 | front sights. |
| 2,403 | front-sight covers. |
| 100 | hinge pin studs. |
| 2,283 | front-sight pins. |
| 749 | tang screws. |
| 7 | carbine bands. |
| 195 | bands, upper. |
| 37 | band swivels. |
| 1,792 | bands, lower. |
| 162 | lock plates. |
| 1,315 | mainsprings. |
| 1,241 | mainspring swivels. |
| 605 | mainspring swivel rivets. |
| 478 | hammers. |
| 1,469 | tumblers. |
| 3,965 | tumbler screws. |
| 1,135 | bridles. |
| 2,817 | bridle screws. |
| 1,778 | sears. |
| 2,386 | sear screws. |
| 1,656 | sear springs. |
| 748 | sear-spring screws. |
| 838 | side screws. |
| 364 | ramrods. |
| 5,000 | ramrods, jointed. |
| 304 | bayonet clasps. |
| 66 | bayonet-clasp screws. |
| 100 | bayonet-clasp stop screws. |
| 374 | bayonets, complete. |
| 312 | swivel rings. |
| 412 | swivels, complete. |
| 204 | locks, complete. |
| 1 | windage-screw head. |
| 1 | windage-screw-head pin. |
| 1 | stock, wood part, Springfield shotgun. |
| 6 | stocks, Colt's revolver. |
| 290 | ejector heads, Colt's revolver. |
| 1 | receiver, Springfield shotgun. |
| 1 | barrels, Springfield shotgun. |
| 4 | plunger springs, Parker shotgun. |
| 254 | extractors, Springfield shotgun. |
| 58 | tumblers, swiveled. |
| 80 | stocks, assembled. |
| 100 | stocks, Hotchkiss navy rifle. |
| 8 | check-rein attachments, "Kelton's." |
| 68 | slides and hooks for saber belts. |
| 1,467 | saber straps. |
| 3 | sections of picket ropes, 1¼ inch. |
| 959 | cincha strays. |

| | |
|---|---|
| 50 | curb straps. |
| 70 | girth straps. |
| 30 | girth billets. |
| 5,000 | halter straps. |
| 355 | coat straps for saddles. |
| 610 | rings, brass, 1¼ inch. |
| 543 | rings, brass, 2¼ inch. |
| 3 | base plates, 12-inch (for armor plate). |
| 184 | silver bars for sharpshooter's badges. |
| 1 | pendant for sharpshooter's badge. |
| 56 | parts of reloading tools. |
| 1 | shell scraper. |
| 2 | shell scrapers, "Morse." |
| 200 | safety straps. |
| 4,480 | staples for rings. |
| 3,100 | stirrups with hoods, G. O. 73. |
| 1 | pair stirrups without hood. |
| 143 | cartridge bags, empty, 3-inch gun. |
| 2,700 | cartridge bags, empty, 3.2 inch gun. |
| 150 | cartridge bags, empty, 4.5-inch siege gun. |
| 280 | cartridge bags, empty, 8 inch converted gun. |
| 500 | cartridge bags, empty, 10 inch Rodman gun. |
| 200 | cartridge bags, empty, 15-inch Rodman gun. |
| 25 | cartridge bags, empty, 12-inch mortar. |
| 75 | cartridge bags, empty, 8-inch steel rifle. |
| 72 | cartridge bags, empty, 5-inch siege rifle. |
| 70 | cartridge bags, empty, 7-inch howitzer. |
| 3,854,000 | cartridge primers. |
| 10,100 | cartridge shells, rifle. |
| 45,000 | cartridge shells, revolver. |
| 475 | cartridge shells, Morse. |
| 62 | parts of "Brinton" targets. |
| 1,418 | parts of "Laidley" revolving target. |
| 81 | parts of "Cushing" targets. |
| 19 | parts of "Texas" targets, |
| 10,650 | cloth silhouettes. |
| 21,410 | paper silhouettes. |
| 266,250 | strings for skirmish targets. |
| 3 | channel beams, 12-inch (armor plate). |

### TOOLS AND MISCELLANEOUS.

| | |
|---|---|
| 258 | arm chests. |
| 2,611 | packing boxes. |
| 100 | boxes for small-arm ammunition. |
| 249 | tin cans. |
| 1 | case. |
| 100 | boxes cleaning material. |
| 50 | packing boxes, "Williston's." |
| 1 | wardrobe. |
| 10 | boxes, reloading tools. |
| 1 | packing crate. |
| 74 | smiths' aprons. |
| 559 | brushes. |
| 62 | bits, assorted. |
| 22 | quarts blacking for leather. |

| | |
|---:|---|
| 356 | chisels, various. |
| 638 | dies, various. |
| 1,179 | drills. |
| 3 | dies, complete for gas-check pads. |
| 1,445 | files, assorted. |
| 262 | files, rotary. |
| 54 | gauges. |
| 500 | gas-checks. |
| 10 | gauges, crusher pressure. |
| 12 | gauges, ring for setting star gauges. |
| 12 | sets star gauge points. |
| 4 | measuring-rods, adjustable. |
| 1 | gauge, verifying. |
| 34 | hammers. |
| 2 | handles. |
| 250 | boxes ingredients for leather blacking. |
| 4 | knife-blades. |
| 16 | mallets. |
| 1 | milling machine. |
| 1 | cartridge-priming and spreading machine. |
| 1,466 | mills, armorers'. |
| 126 | mandrels. |
| 1,398 | pounds harness oil. |
| 1 | power press. |
| 5 | punches, assorted. |
| 25 | pounds black paint. |
| 180 | pounds olive paint. |
| 120 | pounds green paint. |
| 2 | watering-pots. |
| 1 | plate, cleaning, sheet-iron. |
| 5 | plugs, screw. |
| 32 | pincers. |
| 100 | pressure-gauge cylinders. |
| 50 | pounds polishing materials. |
| 144 | ounces polish for leather. |
| 100 | portable arm-racks. |
| 356 | reamers. |
| 123 | arm-racks, altered. |
| 3 | stamps, seal. |
| 20 | sets stencil plates. |
| 29 | boxes stencil paste. |
| 600 | brass springs, with copper tongues. |
| 600 | upper cores, with hollow pins. |
| 88 | ounces scouring material. |
| 1 | sluice-gate, cast iron. |
| 1 | table. |
| 241 | taps, various. |
| 877 | tools for current service. |
| 1 | pin-driver. |
| 1,000 | truncated paper bands. |
| 600 | truncated paper cores. |
| 1 | wrench. |
| 1 | wire-scratch brush. |
| 21 | castings, various. |
| 32 | creasers and taps. |

| | |
|---|---|
| 300 | hawser cutters. |
| 300 | hawser cutter knives. |
| 25 | pounds hektograph composition. |
| 10 | blocks, punching, lead. |
| 96 | bottles indelible ink. |
| 1 | water boiler, cast iron. |
| 12 | posts, iron for military reservation. |
| 4 | button brushes. |
| 4 | button sticks. |
| 4 | pans, ash. |
| 1 | hektograph. |

# APPENDIX 2.

---

## *STATEMENT OF PRINCIPAL ARTICLES PROCURED BY PURCHASE DURING THE YEAR ENDED JUNE* 30, 1888.

### CLASS I.

| | |
|---|---|
| 1 | 12-inch breech-loading rifle. |
| 1 | 12-inch breech-loading rifled mortar. |
| 4 | 3.2-inch steel field guns. |

### CLASS II.

| | |
|---|---|
| 50 | portable forges. |

### CLASS IV.

| | |
|---|---|
| 3,000 | 8-inch "Eureka" chilled cored shot. |
| 4 | 7-inch "Stevens" dynamite shells. |
| 50 | 3.2-inch "Sawyer" canister. |
| 50 | steel case shot. |

### CLASS VI.

| | |
|---|---|
| 10 | Spencer repeating shot-guns. |

### CLASS VII.

| | |
|---|---|
| 2,000 | artillery saddle blankets. |
| 2,000 | cavalry saddle blankets. |
| 13,994 | woven cartridge belts, caliber .45. |
| 6 | currycombs. |
| 10,000 | knives. |
| 10,000 | forks. |
| 10,000 | spoons. |
| 24 | tin cups. |

### CLASS VIII.

| | |
|---|---|
| 137,020 | pounds small-arms powder. |
| 20,882¼ | pounds brown prismatic powder. |
| 128,400 | pounds hexagonal powder. |
| 300 | pounds square powder. |
| 100 | pounds giant powder. |
| 700,000 | rifle ball cartridges, caliber .50. |
| 200 | giant-powder caps. |

| | |
|---:|---|
| 250,000 | wads. |
| 16,000 | cartridge primers. |
| 1,000 | cannon primers. |
| 500 | feet safety-fuse. |

### CLASS IX.

| | |
|---:|---|
| 2 | double blocks. |
| 2 | single blocks. |
| 2 | differential pulley blocks. |
| 8 | tackle-blocks. |
| 4 | pulley blocks. |

### CLASS X.

| | |
|---:|---|
| 8,259 | parts of Colt's revolver. |
| 76 | parts of shotguns. |
| 17 | parts of Gatling guns. |
| 26,767 | gun-stocks. |
| 183 | "Archibald" wheels for artillery carriages. |
| 106⅝ | pounds escutcheon pins. |
| 15,132 | bar buckles. |
| 11,500 | iron rings. |
| 7,124 | halter squares. |
| 4,320 | halter bolts. |
| 3,024 | spring snaps. |
| 200 | copper bands for 8-inch shot. |
| 2,468 | staves for stirrups. |
| 1,872 | brass grommets. |
| 6 | horse collars. |
| 621 | parts of saddles. |
| 25 | wrought-iron axles for gun-carriages. |
| 2 | parts of 12-inch rifle. |
| 32 | parts of mortar carriage. |

## *PART SECOND.*

### CLOTH, ROPE, THREAD, ETC.

| | |
|---:|---|
| 96⅓ | yards carpeting. |
| 208⅓ | yards cloth, woolen. |
| 12 | yards cloth, asbestos. |
| 32 | yards cloth, oiled and enameled. |
| 80,465 | yards cotton cloth. |
| 957 | yards felt. |
| 7,795½ | pounds cotton waste. |
| 928¾ | pounds cord and twine. |
| 410 | yards cord. |
| 151¾ | yards canton flannel. |
| 350 | yards flannel. |
| 10 | pounds flock. |
| 785 | pounds hair. |
| 40 | yards linoleum. |
| 19 | mats. |
| 193 | pounds oakum. |
| 4,208½ | pounds rope. |

| | |
|---|---|
| 1, 277$\frac{3}{8}$ | pounds thread. |
| 72 | spools thread. |
| 18 | towels. |
| 6 | yards toweling. |
| 51, 220 | yards webbing. |
| 79 | window shades. |
| 1, 150 | yards tape. |

### FORAGE.

| | |
|---|---|
| 14, 882 | pounds barley. |
| 13, 295 | pounds bran. |
| 775 | bushels corn. |
| 18 | barrels flour. |
| 17$\frac{1}{2}$ | bushels grass-seed. |
| 2, 610 | pounds grass-seed and lawn dressing. |
| 13$\frac{138}{2000}$ | tons hay. |
| 5, 500 | pounds ground feed. |
| 22, 150 | pounds meal. |
| 7, 366 | bushels meal. |
| 7, 036 | bushels oats. |
| 21 | barrels salt. |
| 3,022 | pounds salt. |
| 45$\frac{1296}{2000}$ | tons straw. |

### IRONMONGERY.

| | |
|---|---|
| 53$\frac{1}{2}$ | pounds babbitt metal. |
| 7 | bath tubs and fixtures. |
| 127, 345 | pounds I and channel beams. |
| 2 | boilers. |
| 7, 507 | bolts. |
| 79 | pounds bolts. |
| 100 | pounds brads. |
| 50 | feet brass rods. |
| 683$\frac{3}{4}$ | pounds brass rod. |
| 2, 603 | pounds brass, sheet. |
| 72 | pounds burs. |
| 41. 496 | buttons. |
| 354 | pounds bronze and brass castings. |
| 210, 550 | pounds iron castings. |
| 749 | pounds steel castings. |
| 1, 890 | feet chain. |
| 360 | cocks, assorted. |
| 98$\frac{3}{4}$ | pounds bar copper. |
| 229, 167$\frac{7}{8}$ | pounds cartridge copper. |
| 1, 476$\frac{1}{2}$ | pounds sheet copper. |
| 3 | sets coupling. |
| 43 | door catches and fixtures. |
| 337, 125 | eyelets. |
| 60 | gas-burners. |
| 35 | gas-fixtures. |
| 5, 286 | pounds grate bar. |
| 60 | papers glazier's points. |
| 806 | pairs hinges. |
| 1, 272 | hooks, assorted. |
| 8, 552 | horseshoes. |

| | |
|---|---|
| 880 | pounds horseshoe nails. |
| 2 | hose fittings. |
| 3, 179 | pounds hoop-iron. |
| $102\frac{1928}{2000}$ | tons pig-iron. |
| 14, 410 | pounds sheet-iron. |
| 80, 116½ | pounds wrought-iron. |
| 550 | feet lightning rod. |
| 6 | lightning rod points. |
| 156 | knobs, assorted. |
| 312 | keys and blanks. |
| 505, 524 | pounds lead: |
| 720 | locks, assorted. |
| 3 | pounds mica. |
| 46, 838¼ | pounds nails. |
| 8, 640 | saddler's nails. |
| 1, 704¼ | pounds nuts. |
| 1, 864 | nuts. |
| 808½ | pounds lead pipe. |
| 7, 505⅞ | feet iron pipe. |
| 20 | feet brass pipe. |
| 318¼ | pounds pipe fittings. |
| 3, 187 | pipe fittings, assorted. |
| 985 | pulleys. |
| 8 | pumps. |
| 4 | radiators. |
| 28, 401½ | pounds rivets, assorted. |
| 76, 678 | rivets, assorted. |
| 593 | pounds rivets and burs. |
| 1, 100 | feet metallic rop |
| 2, 381 | gross screws. |
| 246 | gross screw-pins and eyes. |
| 5 | pounds staples. |
| 11 | staples. |
| 4 | sinks. |
| 9, 580 | pounds sash-weights. |
| 175 | pounds solder. |
| 11, 767 | pounds spikes. |
| 154 | springs, assorted. |
| 953, 886 | pounds bar and plate steel. |
| 14, 633 | pounds steel forgings. |
| 14, 743 | pounds sheet steel. |
| 1, 802, 000 | tacks, assorted. |
| 280¾ | pounds tacks, assorted. |
| 47,846 | pounds block-tin. |
| 750 | pounds tin-foil. |
| 107 | boxes sheet-tin. |
| 1,314¼ | feet sheet-tin. |
| 95⅞ | pounds tubing. |
| 121⅞ | pounds washers. |
| 14 | water closets and fixtures. |
| 1 | urinal and fixtures. |
| 1,194½ | pounds brass wire. |
| 355¼ | pounds copper wire. |
| 111 | pounds copper-covered wire. |
| 4,382½ | pounds copper cartridge wire. |
| 20 | pounds insulated copper wire. |

| | |
|---|---|
| 12,477¼ | pounds iron wire. |
| 7,950 | pounds steel wire. |
| 147½ | pounds steel music wire. |
| 800 | feet copper wire. |
| 500 | feet copper-covered wire. |
| 7 | feet gun-screw wire. |
| 3,339 | pounds zinc. |
| 68 | feet zinc. |
| 3,607 | square feet wire-cloth. |
| 169 | square yards wire-cloth. |
| 48 | feet wire grating and netting. |
| 444 | window fixtures. |
| 42 | sets window fixtures. |
| 68,391 | pounds steel rails. |

## LEATHER.

| | |
|---|---|
| 335 | pounds black wax. |
| 12,912 | feet leather belting. |
| 1,323½ | pounds bridle leather. |
| 36 | pounds bull-neck leather. |
| 29 | pounds belt leather. |
| 223 | pounds buff leather. |
| 56,158¼ | pounds harness leather. |
| 310 | pounds lag leather. |
| 393¼ | pounds lace leather. |
| 39½ | pounds polishing leather. |
| 1,535 | pounds strap leather. |
| 54 | pounds walrus leather. |
| 74 | pounds sole leather. |
| 18½ | square feet belt leather. |
| 637¼ | square feet calf-skin leather. |
| 61,331½ | square feet collar leather. |
| 52 | square feet enameled leather. |
| 50 | square feet lace leather. |
| 586 | sides bridle leather. |
| 1,665 | sides collar leather. |
| 1 | side calf-skin leather. |
| 12 | sides lace leather. |
| 25 | sides rawhide. |
| 1,500 | feet belt lacings. |
| 1,178⅛ | pounds bristles. |
| 2 | skins morocco. |
| 60 | sheepskins. |
| 5 | buckskins. |
| 18 | drop belts, leather. |

## LUMBER.

| | |
|---|---|
| 399,719⅞ | feet boards. |
| 30,300 | laths. |
| 482,047⅛ | feet plank. |
| 318 | posts and rails. |
| 85,417 | feet scantling. |
| 63,115 | shingles. |
| 7,100 | feet strips. |
| 115,679¼ | feet timber. |

### BUILDING MATERIAL.

| | |
|---|---|
| 75$\frac{1}{4}$ | pounds asbestos. |
| 130 | square feet asbestos. |
| 653, 713 | bricks. |
| 2, 062 | barrels cement. |
| 156 | feet cement pipe. |
| 82 | barrels clay. |
| 4 | cubic yards clay. |
| 21 | doors, wood. |
| 2, 170 | feet drain-pipe. |
| 25 | drain pipes. |
| 6, 122$\frac{1}{4}$ | cubic feet flagging. |
| 268$\frac{2}{5}$ | square feet flagging. |
| 7, 773$\frac{1}{2}$ | feet window-glass. |
| 459 | lights window-glass. |
| 1 | load gravel. |
| 4$\frac{1}{6}$ | cubic yards gravel. |
| 80$\frac{1}{2}$ | bushels plastering-hair. |
| 85 | pounds plastering-hair. |
| 1, 535 | barrels lime. |
| 1, 012$\frac{1}{3}$ | bushels lime. |
| 21 | barrels plaster of paris. |
| 1, 331$\frac{56}{100}$ | cubic yards sand. |
| 1, 448$\frac{1}{2}$ | bushels sand. |
| 1, 100$\frac{692}{1000}$ | cubic yards stone. |
| 7 | mantels. |
| 17, 852 | slates. |
| 20 | barrels stucco. |
| 34, 121 | pounds roofing iron. |
| 4, 320 | feet tarred paper. |
| 3, 576 | feet moldings. |
| 53 | rolls wall-paper. |
| 3 | rolls bordering-paper. |
| 496 | feet terra-cotta pipe. |
| 7 | terra-cotta traps, etc. |
| 518 | tiles. |
| 48 | pairs window blinds. |
| 100 | pairs window sash. |
| 1 | transom. |
| 112 | feet water spouts. |
| 48 | water-spout elbows and hooks. |
| 1,191 | feet weather strips. |

### HEATING, LIGHTING, ETC.

| | |
|---|---|
| 94 | gallons anti-corrosive fluid for boilers. |
| 511 | brooms. |
| 158 | brushes, dusting, etc. |
| 52 | pounds candles. |
| 6 | chandeliers. |
| 151$\frac{11}{36}$ | square feet card-clothing. |
| 28,672$\frac{1}{2}$ | bushels charcoal. |
| 148 | barrels charcoal. |
| 351 | chamois-skins. |
| 2, 302$\frac{102}{2240}$ | tons anthracite coal. |

| | |
|---|---|
| $2,815\frac{1566}{2240}$ | tons bituminous coal. |
| 72,900 | pounds coke. |
| 939 | bushels coke. |
| 554 | pounds corundum. |
| 359 | corundum and emery wheels. |
| 67 | reams crocus and emery cloth. |
| 25 | carats diamond powder. |
| 2,573 | pounds emery. |
| 14,750 | fire-brick. |
| 16 | sets fire-brick. |
| 46 | cords fire-wood. |
| 60 | grates and fixtures. |
| 1 | heating furnace and car. |
| 6,720 | pounds fluorspar. |
| 8 | lanterns. |
| 22 | lamps. |
| 540 | lamp fixtures. |
| $51\frac{1}{2}$ | pounds lamp wick. |
| 12 | lamp wicks. |
| $43\frac{1}{2}$ | gross matches. |
| 27 | mops and handles. |
| 740 | pounds polishing compound. |
| 135 | pounds pumice stone. |
| 19 | registers. |
| 333 | pounds rotten-stone. |
| 125 | pounds rosin. |
| 51 | reams sand-paper. |
| 92 | cakes sapolio. |
| $3,658\frac{7}{8}$ | pounds soap. |
| 799 | gallons soft soap. |
| $4\frac{720}{2000}$ | tons molding sand. |
| $216\frac{3}{8}$ | pounds sponge. |
| 9 | stoves. |
| 11 | stove fixtures. |
| 25 | pounds stove-polish. |
| 30 | papers stove-polish. |
| 22 | stove-pipe elbows. |
| 129 | feet stove-pipe. |
| 155 | pounds stove-pipe. |
| 132 | feet steam-pipe covering. |
| 66 | barrels sea-coal facings. |
| 412 | papers tripoli. |
| 50 | pounds tripoli. |
| 25 | pounds quartz. |
| 9 | wash-stands and fixtures. |
| 3 | wash-tubs, basins, etc. |

### OFFICE USE.

| | |
|---|---|
| 5 | baskets, waste. |
| 17 | books of reference. |
| 1 | book-case. |
| 1,060 | sheets card-board. |
| 11 | pounds card-board. |
| 3 | clocks. |
| 17 | chairs, stools, etc. |

| | |
|---|---|
| 12 | chair-bottoms. |
| 3 | cuspidors. |
| 106 | drawing instruments. |
| 47 | pans drawing material. |
| 56 | bottles drawing material. |
| 1,095 | dials for watch clock. |
| 28,650 | envelopes. |
| 4 | electrotypes. |
| 4 | pieces India rubber. |
| 4 | pieces India ink. |
| 51 | bottles ink. |
| 27 | pounds printer's ink. |
| 24 | leads for pencil. |
| 2 | bottles mucilage. |
| $15\frac{3}{20}$ | reams paper. |
| 517 | sheets paper. |
| 92 | pads. |
| 630 | pencils. |
| 15 | boxes paper fasteners. |
| 3,076 | paper fasteners. |
| 95 | gross pens. |
| 6 | boxes pins. |
| 36 | pencil and pen holders. |
| 3 | type-writers, hektograph, etc. |
| 5 | ribbons for type-writer. |
| 5 | fonts of type. |
| $49\frac{1}{2}$ | pounds type metal. |
| 18 | spools tape. |
| 16 | gross rubber bands. |
| 73 | rubber stamps. |
| $51\frac{1}{4}$ | pounds roller composition. |
| 34 | boxes seals. |
| 50 | sheets stencil boards. |
| 243 | pounds sealing wax. |
| 108 | thumb-tacks. |
| 8,000 | tags. |
| 1 | McGill's staple press. |

### LABORATORY USE.

| | |
|---|---|
| 144 | bottles and vials. |
| 14 | barometers and thermometers. |
| 2,160 | corks. |
| 104 | crucibles. |
| 8 | carboys. |
| 6 | gauge glasses. |
| 24 | glass tubes. |
| 30 | level glasses. |
| 200 | pounds zinc batteries. |
| 127 | parts of electric batteries. |
| $28,835\frac{1}{2}$ | pounds acid. |
| 8 | gallons acid. |
| $352\frac{3}{4}$ | gallons alcohol. |
| 1 | gallon tincture of arnica. |
| 40 | pounds alum. |
| 10 | pounds aqua ammonia. |

| | |
|---|---|
| 26 | pounds beeswax. |
| 100,686 | pounds ground bone. |
| 15 | pounds borax. |
| 2 | pounds camphor. |
| 25 | pounds chalk. |
| 15 | pounds chlorides, various. |
| 100 | pints Pratt's chloride. |
| 150 | grains chloride of gold and sodium. |
| 25 | pounds copper and its preparations. |
| 46 | cans concentrated lye. |
| 2,955 | pounds glue. |
| 286 | pounds glycerine. |
| 10 | pounds gelatine. |
| 160 | pounds ground glass. |
| 14 | pounds gum arabic. |
| 45 | pounds gum tragacanth. |
| 48 | hand grenades. |
| 150 | pounds glauber salts. |
| 284 | gallons isinglass. |
| 64¼ | pounds iron and its preparations. |
| 1 | pound laudanum. |
| 9 | bottles liniment. |
| 4½ | gallons molasses. |
| 118½ | pounds mercury and its salts. |
| 51 | pounds spirits of niter. |
| 37½ | pounds nickel salts. |
| 3 | ounces nitrate of silver. |
| 150 | pounds oxides, various. |
| 12,287 | pounds sal soda. |
| 3,156 | pounds soda and its preparations. |
| 21,800 | pounds straw boards. |
| 8 | pounds sulphur. |
| 115 | pounds sal ammoniac. |
| 2 | barrels pitch. |
| 2,636½ | pounds potash, various. |
| 419 | reams paper. |
| 34,471½ | pounds paper. |
| 8 | rolls paper. |
| 418 | yards paper. |
| 6 | barrels tar. |
| 5 | pounds prepared tar. |
| 1,238½ | pounds tallow. |

### PAINTS, OILS, ETC.

| | |
|---|---|
| 4 | pounds asphaltum. |
| 162⅕ | gallons benzine. |
| 2 | pounds bronze copper. |
| 8 | gallons coal tar. |
| 60 | gallons drier. |
| 36,493 | gallons gasoline. |
| 353 | pounds kalsomine. |
| 94 | pounds lampblack. |
| 290 | pounds lubricating compound. |
| 92 | pounds black lead. |
| 20 | pounds red lead. |

| | |
|---|---|
| 15,238 | pounds white lead. |
| 45 | pounds extract of logwood. |
| 50 | gallons lacquer. |
| 621 | gallons naphtha. |
| 54 | pounds nut-galls. |
| 14½ | gallons castor oil. |
| 55 | gallons cod-liver oil. |
| 102 | gallons dressing oil. |
| 10 | pounds dressing oil. |
| 2,739½ | gallons illuminating oil. |
| 5,107½ | gallons lubricating oil. |
| 6 | bottles lubricating oil. |
| 1,398¼ | gallons oil, mixing paints. |
| 3,373⅛ | pounds paint, dry. |
| 5,813⅓ | pounds paint, in oil. |
| 6 | gallons paint, in oil. |
| 4,072 | gallons petroleum and its products. |
| 175½ | pounds putty. |
| 514 | pounds shellac. |
| 772½ | gallons spirits of turpentine. |
| 20 | pounds turpentine. |
| 157 | gallons varnish. |
| 4,663 | pounds whiting. |
| 250 | pounds zinc. |

### MISCELLANEOUS.

| | |
|---|---|
| 1 | row-boat. |
| 2 | barrels. |
| 24 | baskets. |
| 785 | paste-board boxes. |
| 3,004 | packing boxes. |
| 1,714 | tin boxes. |
| 128 | tin cans. |
| 73½ | pounds gutta percha. |
| 222 | boxes axle grease. |
| 506½ | pounds axle grease. |
| 2 | horses. |
| 2 | hose carts, reels, etc. |
| 1,637 | feet rubber hose. |
| 8,005¼ | pounds Japan wax. |
| 571¾ | pounds packing, various. |
| 98 | feet packing, various. |
| 100 | powder canisters, 2-pound. |
| 250 | powder canisters, 5-pound. |
| 4 | rubber aprons. |
| 8 | pairs rubber gloves. |
| 10 | rubber gaskets. |
| 8 | pairs rubber boots. |
| 8 | pairs rubber shoes. |
| 298 | rubber rings, etc. |
| 58 | pounds rubber valves. |
| ⅓ | pound rubber tubing. |
| 136⅞ | pounds rubber, sheet. |
| 1,100 | tickets, railroad and street car. |
| 2 | lap-robes. |
| 6 | whips. |

| | |
|---|---|
| 10 | parts of wagons. |
| 24 | finger cots. |
| 1 | mirror. |
| 1,080 | screw-tops for cans. |
| 5,500 | pounds fertilizers. |
| 49 | loads manure. |
| 1 | flag-staff. |
| 1 | wrought-iron water tank. |
| 1 | marble slab. |

## MACHINES.

| | |
|---|---|
| 3 | lawn mowers. |
| 4 | steam boilers. |
| 6 | lathes. |
| 1 | lathe chuck. |
| 4 | steam engines. |
| 1 | lawn sprinkler. |
| 1 | gas-fitters' test pump, with gauge. |
| 3 | feed pumps. |
| 1 | feed-water heater. |
| 1 | wind-mill. |
| 1 | automatic knife grinder. |
| 2 | emery wheel tool grinder. |
| 2 | mortising and boring machines. |
| 1 | slotting-machine. |
| 1 | center grinder. |
| 1 | shaping machine. |
| 1 | pipe-cutting and threading machine. |
| 1 | drill machine. |
| 1 | gear-cutting machine. |
| 1 | paper-cutter, with extra knife. |
| 1 | type-writing machine, complete. |
| 16 | machines, various. |
| 84 | parts of machines. |
| 232 | parts of mowing-machines. |

## TOOLS, ETC.

| | |
|---|---|
| 206 | awls. |
| 1 | ax. |
| 80 | bits. |
| 1 | set bits. |
| 1 | brace. |
| 160 | buckets. |
| 1,553 | brushes and sash tools. |
| 416 | carpenters' tools, various. |
| 760 | pounds chalk-lines. |
| 14 | coal-hods. |
| 209 | drills. |
| 4 | dies. |
| 2,340 | files. |
| 40 | forks (hay and manure). |
| 4 | gauges. |
| 3,601 | pounds grindstones. |
| 1 | grindstone, mounted. |
| 71 | hatchets and hammers. |

| | |
|---|---|
| 797 | handles, various. |
| 27 | hoes. |
| 120 | knives, saddlers', etc. |
| 3 | ladders. |
| 4½ | sets ladders. |
| 11 | machinists' tools, various. |
| 87 | pairs nippers. |
| 150 | papers needles. |
| 95 | oil-stones. |
| 137 | oil cups and oilers. |
| 5 | planes. |
| 9 | plows. |
| 150 | pounds plow points. |
| 26 | picks. |
| 79 | punches. |
| 95 | rakes. |
| 594 | rasps. |
| 24 | rivet-sets. |
| 25 | rules. |
| 165 | saddlers' tools, various. |
| 28 | sandstones. |
| 85 | spades and shovels. |
| 60 | stamps. |
| 7 | sets of stamps. |
| 59 | saws. |
| 21 | saw-blades. |
| 6 | sieves and sifters. |
| 2 | scales. |
| 110 | pairs of shears. |
| 64 | screw-drivers. |
| 3 | spirit levels. |
| 53 | scythes. |
| 16 | scythe-snaths. |
| 89 | scythe-stones. |
| 3 | tape-lines. |
| 3 | sets of taps. |
| 2 | trowels. |
| 51 | utensils, various. |
| 123 | wrenches. |
| 38 | wheelbarrows. |
| 3 | tinners' tools, various. |
| 1 | paint burner. |
| 1 | set tools for milling-machine. |

# APPENDIX 3.

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### *STATEMENT OF ORDNANCE, ORDNANCE STORES, ETC., ISSUED TO THE MILITARY ESTABLISHMENT, INCLUDING THE NATIONAL HOMES FOR SOLDIERS OF THE VOLUNTEER AND REGULAR ARMY, AND EXCLUSIVE OF THE MILITIA, DURING THE FISCAL YEAR ENDED JUNE* 30, 1888.

## CLASS I.

| | |
|---|---|
| 14 | Gatling guns, long, 10 barrel, caliber .45-inch. |
| 3 | Hotchkiss mountain guns, caliber 1.65-inch. |
| 3 | 3-inch rifled guns. |
| 6 | 3.2-inch B. L. steel rifled guns. |
| 2 | 4.5-inch rifled siege guns. |
| 1 | 12-pounder bronze gun. |
| 1 | 5-inch breech-loading steel siege gun. |
| 1 | 7-inch breech-loading steel siege howitzer. |
| 1 | 15-inch Rodman gun. |
| 2 | 10-inch siege mortars. |

## CLASS II.

| | |
|---|---|
| 7 | Gatling gun carriages and limbers, metallic. |
| 7 | Gatling gun carriages and limbers, wood. |
| 3 | Hotchkiss mountain gun carriages. |
| 9 | 3-inch gun carriages. |
| 4 | 3.2-inch gun, steel carriages. |
| 3 | 12-pounder gun carriages. |
| 2 | 4.5-inch gun carriages. |
| 1 | 5-inch gun steel carriage. |
| 1 | 15-inch gun barbette carriage and chassis. |
| 8 | 3-inch gun caissons and limbers. |
| 1 | battery wagon "C" and limber. |
| 3 | mortar beds. |
| 1 | mortar wagon and limber. |

## CLASS III.

| | |
|---|---|
| 42 | harness bags. |
| 2 | budge-barrels. |
| 2 | elevating bars. |
| 5 | baskets for mortar implements. |
| 1 | forge bucket, wood. |
| 2 | sponge buckets, wood. |
| 1 | tar bucket, iron. |
| 134 | watering buckets, gutta-percha. |

| | |
|---|---|
| 9 | water buckets, iron. |
| 6 | water buckets, leather. |
| 8 | water buckets, papier maché. |
| 10 | water buckets, rubber. |
| 6 | cannon spikes. |
| 1 | breech cover, Hotchkiss gun. |
| 3 | dredging boxes. |
| 3 | fuse blocks. |
| 2 | fuse gauges. |
| 9 | fuse gouges. |
| 1 | fuse plug reamer. |
| 9 | fuse plug wrenches. |
| 5 | gunners' gimlets. |
| 6 | gunners' haversacks. |
| 3 | gunners' levels. |
| 18 | gunners' pincers. |
| 3 | gunners' quadrants. |
| 22 | gunners' sleeves. |
| 14 | handspikes, maneuvering. |
| 19 | handspikes, trail. |
| 8 | handspikes, shod, for mortar. |
| 29 | sets harness, 2 lead horses. |
| 18 | sets harness, 2 wheel horses. |
| 1 | set harness, Laidley cavalry forge. |
| 1 | set harness, mountain howitzer carriages. |
| 4 | common lanterns. |
| 3 | dark lanterns. |
| 1 | magazine lantern. |
| 20 | lanyards. |
| 1 | muzzle cover. |
| 10 | packing outfits. |
| 39 | paulins, 12 by 15 feet. |
| 4 | powder funnels. |
| 32 | powder measures. |
| 12 | powder scoops. |
| 6 | plummets. |
| 15 | plummet cords. |
| 8 | priming wires, field guns. |
| 4 | priming wires, siege guns. |
| 29 | prolonges. |
| 2 | quoins. |
| 2 | rammers and staves, 3.2-inch gun. |
| 7 | rammers and staves, 4.5-inch gun. |
| 12 | scrapers for shot. |
| 100 | securing stakes. |
| 2 | shell hooks. |
| 2 | breech sights, 4.5-inch gun. |
| 4 | breech sights, 8-inch rifle. |
| 1 | breech sight, 8-inch howitzer. |
| 1 | muzzle sight, 3.2-inch rifle. |
| 2 | muzzle sights, 4.5-inch gun. |
| 4 | muzzle sights, 8-inch rifle. |
| 21 | sponge covers, 3 inch rifle. |
| 4 | sponge covers, 3.2-inch rifle. |
| 9 | sponge covers, 12 pounder gun. |
| 19 | sponges and rammers, 3-inch rifle. |

| | |
|---|---|
| 2 | sponges and rammers, 3.2-inch rifle. |
| 1 | sponge and rammer, 6-pounder gun. |
| 5 | sponges and rammers, 12-pounder gun. |
| 2 | sponges and rammers, 24-pounder mortar. |
| 14 | sponges and staves, 4.5-inch gun. |
| 19 | thumbstalls. |
| 14 | tompions, 3-inch rifle. |
| 3 | tompions, 4.5-inch gun. |
| 2 | tompions, 24-pounder mortar. |
| 6 | tompions, 10-inch mortar. |
| 4 | tow hooks. |
| 7 | tube pouches. |
| 33 | vent covers. |
| 14 | vent pieces. |
| 8 | vent punches. |
| 2 | wipers for mortar. |
| 13 | worms and staves. |

### IMPLEMENTS FOR GATLING GUN.

| | |
|---|---|
| 7 | cam extractors. |
| 13 | drifts. |
| 23 | feed guides. |
| 28 | feed magazines. |
| 4 | gun covers. |
| 8 | handspikes. |
| 6 | headless shell extractors. |
| 7 | pointing levers. |
| 14 | lock screw-drivers. |
| 14 | small screw-drivers. |
| 14 | T screw-drivers. |
| 7 | shell drivers. |
| 14 | wiping rods. |
| 4 | pointing-lever axis pin nuts. |
| 14 | oilers. |
| 1 | hopper. |
| 3 | sight cases. |
| 7 | cascabel plate wrenches. |
| 3 | lever nut wrenches. |
| 13 | pin wrenches. |
| 7 | rear-guide nut wrenches. |
| 3 | sets accessories for Hotchkiss ammunition wagon. |
| 1 | set reloading tools for Hotchkiss revolving gun. |

### CLASS IV.

| | |
|---|---|
| 50 | 30-pounder shot. |
| 140 | 4.5-inch shot. |
| 204 | 8-inch shot. |
| 30 | 11-inch shot. |
| 16 | 15-inch shot. |
| 90 | 1.5-inch Hotchkiss cartridges. |
| 800 | 1.5-inch Hotchkiss shell. |
| 300 | 1.65-inch Hotchkiss shell. |
| 565 | 3-inch shell. |
| 1,100 | 3.2-inch shell. |

| | |
|---|---|
| 250 | 12-pounder shell. |
| 20 | 24-pounder shell. |
| 150 | 5-inch shell. |
| 150 | 7-inch shell. |
| 211 | 8-inch shell. |
| 82 | 10-inch mortar shell. |
| 300 | 12-inch mortar shell. |
| 48 | 13-inch shell. |
| 315 | 3-inch case shot. |
| 200 | 3.2-inch case shot. |
| 60 | 3-inch canister. |
| 40 | 3.2-inch canister. |
| 250 | 12-pounder canister. |

## CLASS VI.

| | |
|---|---|
| 2,781 | Springfield carbines, caliber .45. |
| 1,132 | Colt's revolvers, caliber .45. |
| 20 | Chaffee-Reece magazine rifles, caliber .45. |
| 20 | Hotchkiss magazine rifles, caliber .45. |
| 20 | Lee magazine rifles, caliber .45. |
| 2,252 | Springfield rifles, caliber .45. |
| 10 | Spencer repeating shotguns. |
| 36 | Springfield shotguns. |
| 6 | artillery officers' sabers. |
| 15 | artillery sabers. |
| 290 | cavalry sabers. |
| 20 | field and cavalry officers' sabers. |
| 101 | musicians' swords. |
| 36 | non-commissioned officers' swords. |
| 269 | hunting knives. |

## CLASS VII.

### ARTILLERY ACCOUTERMENTS.

| | |
|---|---|
| 136 | knapsacks. |
| 97 | saber belts. |
| 99 | saber-belt plates. |

### CAVALRY EQUIPMENTS.

| | |
|---|---|
| 2,998 | canteen straps. |
| 2,136 | cartridge belts. |
| 1,242 | carbine slings. |
| 947 | carbine-sling swivels. |
| 321 | pistol cartridge pouches. |
| 2,100 | pistol holsters. |
| 200 | pistol pack boxes. |
| 600 | spring bands, brass. |
| 1,000 | truncated paper bands. |
| 1,200 | wooden upper cores. |
| 858 | saber attachments. |
| 2,949 | saber belts. |
| 2,735 | saber-belt plates. |
| 1,049 | saber knots. |
| 271½ | pairs saber straps. |

### INFANTRY EQUIPMENTS.

| | |
|---|---|
| 1,299 | bayonet scabbards. |
| 1,640 | blanket bags. |
| 24 | blanket and coat straps. |
| 751½ | pairs blanket bag coat straps. |
| 1,477 | pairs blanket bag shoulder straps. |
| 6,749 | canteens. |
| 1,106 | canteen covers. |
| 355 | canteen corks and chains. |
| 3,124 | canteen straps. |
| 6 | carrying braces. |
| 2,090 | cartridge belts. |
| 1,386 | cartridge-belt plates. |
| 2,770 | cartridge boxes. |
| 2 | cartridge blocks. |
| 2,311 | clothing bags. |
| 2,303 | clothing-bag straps. |
| 2,959 | forks. |
| 3,109 | knives. |
| 3,888 | spoons. |
| 13 | frogs, bayonet scabbard. |
| 44 | frogs, sliding. |
| 5,319 | gun slings. |
| 3,482 | haversacks. |
| 1,000 | haversacks with web straps. |
| 2,769 | haversack straps. |
| 20 | magazine belts. |
| 4,459 | meat cans. |
| 309 | hunting-knife scabbards. |
| 12 | intrenching-tool scabbards. |
| 4,433 | tin cups. |
| 26 | non-commissioned officers' waist belts and plates. |
| 2,805 | waist belts. |
| 2,376 | waist-belt plates. |

### APPENDAGES.

| | |
|---|---|
| 4 | brushes and thongs. |
| 3,338 | headless shell extractors. |
| 2,130 | jointed ramrods. |
| 12 | cleaning rods, shotgun. |
| 2,208 | screw-drivers, carbine and rifle. |
| 410 | screw-drivers, revolver. |
| 20 | screw-drivers, Lee rifle. |
| 10 | screw-drivers, shotgun. |
| 5 | wire scratch brushes. |
| 20 | wiping brushes, Lee rifle. |
| 99 | spring vises. |
| 365 | tumbler punches. |
| 1 | wiper, rod bayonet. |
| 2,062 | wiping rods, wood, carbine. |
| 6,232 | wiping rods, wood, rifle. |
| 2 | wiping rods, shotgun. |

### HORSE EQUIPMENTS FOR CAVALRY.

| | |
|---|---|
| 1,144 | curb bridles. |
| 2,007 | watering bridles. |
| 1,009 | carbine boots and straps. |
| 678 | cinchas. |
| 2,640 | curry-combs. |
| 273 | cruppers. |
| 31 | forage sacks. |
| 19 | girths. |
| 3,972 | halters. |
| 6,194 | halter straps. |
| 3,658 | horse brushes. |
| 599 | horse covers. |
| 2,222 | lariats. |
| 749 | links. |
| 65 | mane combs. |
| 3,899 | nose bags. |
| 1,472 | picket pins. |
| 430 | saber straps for saddles. |
| 1,084 | saddles. |
| 166 | saddle-bags, canvas. |
| 1,164 | saddle-bags, leather. |
| 4,732 | saddle blankets. |
| 20 | saddle cloths. |
| 873 | side lines. |
| 6 | side-line fasteners. |
| 2,636 | spurs. |
| 4,800 | spur straps. |
| 3,638 | stirrups. |
| 4 | stirrups with guidon sockets. |
| 972 | stirrup straps. |
| 2,404 | surcingles. |

## CLASS VIII.

### SMALL-ARM AMMUNITION.

| | |
|---|---|
| 1,004,400 | carbine ball cartridges, caliber .45. |
| 392,836 | revolver ball cartridges, caliber .45. |
| 252,490 | revolver blank cartridges, caliber .45. |
| 2,900,790 | rifle ball cartridges, caliber .45. |
| 251,080 | rifle blank cartridges, caliber, .45. |
| 20,000 | rifle blank cartridges, caliber .50. |
| 626,000 | round balls, caliber .45. |
| 2,350,512 | carbine bullets, caliber .45. |
| 312,000 | revolver bullets, caliber .45. |
| 4,586,451 | rifle bullets, caliber .45. |
| 76,687 | pounds small-arms powder. |
| 10,147,300 | cartridge primers. |
| 8,150 | cartridge shells. |
| 14,300 | pounds shot. |
| 22 | shot-gun outfits, except tools and cases. |
| 183,250 | cartridge wads. |

### AMMUNITION FOR CANNON.

| | |
|---|---|
| 7,345 | blank cartridges, 3-inch gun. |
| 100 | blank cartridges, 12-pounder gun. |
| 74 | 1.5-inch cartridge cases. |
| 875 | metallic fuses. |
| 751 | paper fuses. |
| 25 | percussion fuses. |
| 32 | wooden fuses. |
| 700 | pounds cannon powder. |
| 24,100 | pounds hexagonal powder. |
| 15 | pounds mealed powder. |
| 3,500 | pounds mortar powder. |
| 1,000 | electric primers. |
| 98,525 | friction primers. |

### CLASS IX.

| | |
|---|---|
| 107 | arm racks. |
| 463 | sharpshooters' badges. |
| 183 | bars for sharpshooter badges. |
| 1 | sling chain. |
| 22 | chocks. |
| 1 | crane. |
| 231 | signal flags. |
| 1 | gun lift. |
| 129 | haliards. |
| 12 | intrenching tools. |
| 6,106 | marksman's buttons. |
| 2,680 | marksman's pins. |
| 3 | marking rods, disks, and brushes. |
| 246 | shot marks and staves. |
| 2 | rail platforms, mortar. |
| 6 | rollers. |
| 160 | streamers. |
| 2 | trace ropes. |

### BRINTON TARGET AND PARTS.

| | |
|---|---|
| 15 | targets, complete. |
| 58 | frames. |

### CUSHING TARGET AND PARTS.

| | |
|---|---|
| 21 | targets, complete. |
| 2 | car frames. |
| 4 | cross pieces and uprights. |
| 134 | frames. |
| 2 | fish plates with bolts and nuts. |
| 12 | rails. |
| 4 | truck wheels and axles. |

### LAIDLEY TARGET AND PARTS.

| | |
|---|---|
| 228 | targets, complete. |
| 96 | axles. |
| 6 | center blocks and pins. |

| | |
|---|---|
| 296 | cross pieces. |
| 865 | frames. |
| 154 | journal boxes. |
| 36 | journal-box pins. |
| 20 | journal posts. |
| 186 | keys for frames. |
| 40 | levers. |
| 91 | lever blocks. |
| 196 | nave boxes. |
| 4 | spring stops. |
| 424 | rails. |
| 481 | uprights. |
| 70,040 | paper targets. |
| 1 | sectional target. |
| 10 | Texas targets. |
| 16 | Texas target centers. |
| 3 | Texas target cross pieces. |
| 6,192 | target centers. |
| 171 | steel target frames. |
| 954 | wood target frames. |
| 14,464,500 | target pasters. |
| 4 | target plates for gallery practice. |
| 10,666 | cloth silhouettes. |
| 63,187 | paper silhouettes. |
| 222,641 | strings for skirmish target. |

### PARTS OF SHOT-GUN OUTFIT.

| | |
|---|---|
| 8 | brush wipers. |
| 86 | powder canisters. |
| 8 | drifts. |
| 7 | field cases. |
| 8 | funnels. |
| 8 | powder and shot chargers. |
| 8 | priming tools. |

### RELOADING TOOLS, ETC.

| | |
|---|---|
| 32 | sets bench tools. |
| 16 | sets hand tools. |
| 24 | combination anvils. |
| 6 | ball molds. |
| 37 | brush wipers. |
| 11 | adjustable chargers. |
| 3 | bench powder chargers. |
| 9 | crimping and reloading dies for revolver cartridges. |
| 85 | crimping and reloading dies for rifle cartridges. |
| 1 | cap for crimping die. |
| 11 | bench resizing dies. |
| 8 | resizing dies for revolver shell. |
| 124 | resizing dies for rifle shell. |
| 27 | drifts. |
| 1 | primer extractor. |
| 65 | primer extractor pins. |
| 31 | funnels. |
| 3 | gauges, total length. |

| | |
|---|---|
| 22 | ladles. |
| 34 | mallets. |
| 35 | oil cans. |
| 55 | priming tools. |
| 9 | priming-tool spindles. |
| 8 | reloading punches for revolver cartridges. |
| 59 | reloading punches for carbine and rifle cartridges. |
| 90 | resizing punches. |
| 3 | safety sockets. |
| 8 | shell extractors. |
| 7 | shell scrapers. |
| 8 | strainers. |
| 30 | wiping rods. |
| 1 | die wrench. |

### PRIMER-INSERTING TOOLS AND PARTS.

| | |
|---|---|
| 2 | primer inserting tools, complete. |
| 3 | bushings. |
| 1 | pinion lever. |
| 2 | primer setters. |
| 2 | screws. |

### PRIMER-EXTRACTING TOOLS AND PARTS.

| | |
|---|---|
| 2 | primer extracting tools, complete. |
| 45 | extractor pins. |
| 1 | spindle. |
| 6 | pin screws. |

### SHELL-RESIZING TOOLS AND PARTS.

| | |
|---|---|
| 2 | shell resizing tools, complete. |
| 1 | base. |
| 1 | lower cross-bar. |
| 43 | dies, lower, rifle. |
| 279 | dies, upper, rifle. |
| 10 | dies, revolver. |
| 1 | ejecting wire. |
| 2 | lever-pin screws. |
| 2 | link-pin screws. |
| 13 | rings. |
| 16 | spindles. |
| 1 | spindle screw. |
| 1 | spindle-screw nut. |
| 2 | rod wrenches. |

### POWDER-CHARGING TOOLS AND PARTS.

| | |
|---|---|
| 2 | chargers. |
| 1 | receiver and funnel. |
| 1 | receiver nut. |
| 2 | wrenches. |

### ASSEMBLING AND CRIMPING TOOLS AND PARTS.

| | |
|---|---|
| 1 | assembling and crimping tool, complete. |
| 17 | dies. |

| | |
|---|---|
| 1 | die-lever pin. |
| 1 | shell rest. |
| 1 | shell-rest set screws. |
| 12 | stems. |
| 2 | stem screws. |
| 2 | stem-lever pin screws. |
| 7 | spindle screws. |
| 1 | check-lever spring. |

## CLASS X.

### PARTS OF CLASS I.

| | |
|---|---|
| 12 | sets DeBangs gas checks. |
| 5 | cups for gas check. |
| 11 | firing pins for Gatling gun. |
| 1 | obturator plate. |
| 2 | screw studs for rifle gun. |
| 2 | spindles and nuts for gas-check pad. |
| 2 | pairs of trunnion rings. |
| 3 | vent pieces. |

### PARTS OF CLASS II.

| | |
|---|---|
| 24 | bolts and nuts. |
| 24 | bolts for pole-yoke collar. |
| 8 | spring brakes for field gun. |
| 2 | limber chests. |
| 1 | elevating screw. |
| 5 | keys for ammunition chest. |
| 48 | linchpins. |
| 4 | nave bands. |
| 16 | nuts for carriage. |
| 23 | poles. |
| 5 | pole yokes. |
| 4 | pole-prop sockets. |
| 1 | rail. |
| 2 | retraction ropes. |
| 1 | pair shafts. |
| 6 | stakes for mortar wagon. |
| 29 | stay pins. |
| 26 | stay-pin keys and chains. |
| 1 | stock, caisson. |
| 1 | stock, carriage. |
| 2 | tire bands. |
| 20 | tire bolts. |
| 40 | washers. |
| 8 | wheels, carriage. |

### PARTS OF CLASS III.

| | |
|---|---|
| 97 | bridles, artillery. |
| 13 | bridle ornaments. |
| 614 | brass-plated buckles. |
| 226 | iron roller buckles. |
| 31 | collars. |

| | |
|---|---|
| 4 | girths for drivers' saddles. |
| 105 | halters, artillery. |
| 80 | halter chains. |
| 50 | halter straps. |
| 1 | pair hames. |
| 25 | hame straps. |
| 52 | double S hooks. |
| 4 | leg guards. |
| 50 | cold shut links. |
| 20 | pole pads. |
| 26 | pole straps. |
| 10 | rammer heads. |
| 70 | rosettes for artillery bridles. |
| 1 | drivers' saddle. |
| 16 | drivers' saddle seats. |
| 6 | sponge heads. |
| 139 | woolen sponges. |
| 24 | staples for valise saddles. |
| 4 | brass stirrups. |
| 20 | stirrup straps. |
| 11 | lead traces. |
| 13 | wheel traces. |
| 233 | whips. |

### PARTS OF CLASSES IV AND V.

| | |
|---|---|
| 700 | base plugs for shell. |
| 100 | sabots for 15-inch shot and shell. |

### PARTS OF CLASS VI.

#### *Springfield carbine.*

| | |
|---|---|
| 7 | bands. |
| 15 | band springs. |
| 146 | bridles. |
| 156 | bridle screws. |
| 132 | breech-block cap-screws. |
| 105 | butt-plates. |
| 5 | butt-plate covers. |
| 12 | butt-plate screws. |
| 140 | cam latch springs. |
| 31 | cover springs. |
| 26 | cover-spring screws. |
| 31 | cover-friction springs. |
| 25 | cover stud pins. |
| 306 | ejector springs. |
| 306 | ejector-spring spindles. |
| 60 | extractors. |
| 262 | firing pins. |
| 140 | firing-pin screws. |
| 152 | front sights. |
| 245 | front-sight covers. |
| 30 | front-sight cover-screws. |
| 8 | hammers. |
| 2 | lock plates. |
| 60 | mainsprings. |

| | |
|---|---|
| 16 | mainspring swivels. |
| 20 | mainspring swivel-rivets. |
| 25 | pistol-grip screws. |
| 692 | rear sights. |
| 146 | rear sight base-screws. |
| 20 | rear sight-leaves. |
| 12 | rear sight-leaf slides. |
| 42 | sears. |
| 152 | sear-screws. |
| 92 | sear springs. |
| 32 | sear-spring screws. |
| 12 | side screws. |
| 328 | stocks, assembled. |
| 42 | stocks, spring-fitted. |
| 696 | stocks, wood part. |
| 207 | swivels. |
| 32 | swivel-bars. |
| 44 | swivel-bar rings. |
| 20 | tang screws. |
| 79 | tumblers. |
| 194 | tumbler-screws. |

### *Springfield rifle.*

| | |
|---|---|
| 351 | lower bands. |
| 79 | upper bands. |
| 180 | band springs. |
| 145 | bayonets. |
| 20 | bayonet clasps. |
| 48 | bayonet-clasp screws. |
| 100 | bayonet-clasp stop-screws. |
| 12 | breech-block caps. |
| 153 | breech-block cap screws. |
| 262 | bridles. |
| 757 | bridle screws. |
| 103 | butt plates. |
| 254 | butt-plate screws. |
| 6 | butt-plate cover screws. |
| 477 | cam-latch springs. |
| 1,965 | ejector springs. |
| 1,373 | ejector spring spindles. |
| 306 | ejector studs. |
| 5,195 | extractors. |
| 5,327 | firing pins. |
| 1,575 | firing-pin screws. |
| 62 | front-sights. |
| 90 | front-sight covers. |
| 181 | front-sight cover screws. |
| 114 | front-sight pins. |
| 126 | guard bows. |
| 170 | guard bow nuts. |
| 341 | guard bow swivels. |
| 269 | guard bow swivel screws. |
| 123 | guard plates. |
| 959 | guard screws. |
| 302 | hammers. |
| 475 | hinge pins. |

| | |
|---|---|
| 77 | locks. |
| 131 | lock plates. |
| 326 | mainsprings. |
| 644 | mainspring swivels. |
| 424 | mainspring swivel rivets. |
| 118 | pistol-grips. |
| 393 | pistol-grip screws. |
| 36 | ramrods. |
| 232 | ramrod stops. |
| 467 | rear sights. |
| 121 | rear sight base screws. |
| 20 | rear sight slide screws. |
| 319 | rear sight screws. |
| 588 | sears. |
| 379 | sear screws. |
| 527 | sear springs. |
| 482 | sear spring screws. |
| 576 | side screws. |
| 194 | side-screw washers. |
| 332 | stocks, wood part. |
| 520 | tang screws. |
| 263 | tips. |
| 307 | tip screws. |
| 594 | triggers. |
| 212 | trigger screws. |
| 753 | tumblers. |
| 417 | tumblers, swiveled. |
| 864 | tumbler screws. |
| 1 | windage screw-head. |
| 1 | windage-screw head pin. |

### *Springfield shotgun.*

| | |
|---|---|
| 1 | barrel. |
| 268 | extractors. |
| 5 | mainsprings. |
| 1 | receiver. |
| 1 | stock. |
| 2 | tumblers. |

### *Spencer repeating shotgun.*

| | |
|---|---|
| 1 | cartridge stop. |
| 2 | cartridge stop-pin screws. |
| 1 | extractor. |
| 1 | firing pin. |
| 1 | firing-pin spring. |
| 1 | magazine spring. |
| 1 | mainspring. |
| 1 | sear spring. |
| 2 | slide-plate screws. |

### *Parker shotgun.*

| | |
|---|---|
| 5 | mainsprings. |
| 16 | plungers. |
| 14 | plunger springs. |
| 4 | tumbler screws. |

### *Hotchkiss magazine rifle.*

| | |
|---|---|
| 20 | extractors. |
| 20 | mainsprings. |

### *Lee magazine rifle.*

| | |
|---|---|
| 4 | extractors. |
| 4 | extractor-springs. |
| 4 | firing pins. |
| 100 | magazines. |
| 20 | magazine springs. |
| 4 | mainsprings. |
| 4 | sear springs. |

### *Colt's revolver.*

| | |
|---|---|
| 111 | back straps. |
| 880 | back-strap screws. |
| 997 | bolts. |
| 985 | bolt screws. |
| 1 | barrel. |
| 515 | center pins. |
| 347 | center-pin bushings. |
| 375 | center-pin catch-screws. |
| 659 | center-pin screws. |
| 21 | cylinders. |
| 661 | ejector heads. |
| 582 | ejector rods. |
| 931 | ejector springs. |
| 369 | ejector tubes. |
| 820 | ejector-tube screws. |
| 332 | firing pins. |
| 326 | firing-pin rivets. |
| 51 | frames. |
| 169 | front sights. |
| 109 | gates. |
| 105 | gate catchers. |
| 304 | gate-catch screws. |
| 344 | gate springs. |
| 105 | guards. |
| 1,322 | guard screws. |
| 1,108 | hammers. |
| 148 | hammer-cams. |
| 286 | hammer rolls. |
| 396 | hammer-roll rivets. |
| 815 | hammer-screws. |
| 696 | hands. |
| 792 | hand-springs. |
| 773 | mainsprings. |
| 705 | mainspring screws. |
| 76 | recoil plates. |
| 32 | sear springs. |
| 38 | sear-spring screws. |
| 1,548 | sear and stop-bolt springs. |
| 1,477 | sear and stop-bolt spring screws. |
| 350 | stocks. |

| | |
|---|---|
| 291 | stop-bolts. |
| 937 | triggers. |
| 875 | trigger screws. |

### *Schofield-Smith & Wesson revolver.*

| | |
|---|---|
| 1 | hammer. |
| 1 | hand-spring. |
| 1 | strain-screw. |
| 26 | triggers. |

| | |
|---|---|
| 12 | mouth pieces for cavalry saber scabbard. |
| 1 | scabbard for musician's sword. |
| 2 | scabbards for non-commissioned officers' swords. |

## PARTS OF CLASS VII.

| | |
|---|---|
| 98 | curb-bits. |
| 24 | bridle headstalls. |
| 24 | pairs bridle-reins. |
| 162 | bridle ornaments. |
| 7, 931 | brass-bar buckles. |
| 2, 620 | brass-wire buckles. |
| 1, 573 | iron-bar buckles. |
| 1, 927 | iron-roller buckles. |
| 198 | cincha straps. |
| 1, 108 | coat-straps. |
| 617 | curb-straps. |
| 10, 620 | brass escutcheon-pins. |
| 364 | halter-bolts. |
| 3 | halter-chains. |
| 245 | halter-rings. |
| 650 | halter-squares. |
| 430 | japanned nails. |
| 938 | ovals. |
| 1, 306 | brass rings. |
| 224 | iron D-rings. |
| 896 | iron rings. |
| 25 | brass shields. |
| 518 | double-spring lariat-snaps. |
| 72 | canteen-strap snaps. |
| 89 | link-snaps. |
| 10 | side-line chains. |
| 372 | side-line fasteners. |
| 126 | saber-belt slides and hooks. |
| 20 | pairs saber-belt slings. |
| 44 | saddle-bag studs. |
| 1, 088 | brass foot-staples. |
| 2, 684 | brass staples for rings. |
| 10⅓ | yards webbing, 3½ inches wide. |
| 59⅓ | yards webbing, 4 inches wide. |

## PARTS OF CLASS VIII.

| | |
|---|---|
| 1, 530 | cartridge bags, 6-pounder gun. |
| 500 | cartridge bags, 12-pounder gun. |
| 2, 787 | cartridge bags, 3-inch gun. |

| | |
|---:|---|
| 500 | cartridge bags, 3.2-inch gun. |
| 1,500 | cartridge bags, 4.5-inch gun. |
| 485 | cartridge bags, 8-inch gun. |
| 500 | cartridge bags, 10-inch gun. |
| 20 | cartridge bags, 10-inch mortar. |
| 300 | cartridge bags, 15-inch gun. |
| 110 | fuse plugs, brass. |
| 100 | fuse plugs, wood. |
| 50 | water caps. |

## PART SECOND.

### CLOTH, ROPE, THREAD, ETC.

| | |
|---:|---|
| 20,092⅓ | yards cotton cloth. |
| 5 | pounds cotton cord. |
| 50 | pounds cotton waste. |
| 32¾ | pounds sash cord. |
| 200 | feet braided sash cord. |
| 10 | pounds curled hair. |
| 10 | pounds marline. |
| 40 | pounds rope. |
| 605 | pounds thread. |
| 635 | pounds tow. |
| 47 | pounds twine. |

### IRONMONGERY.

| | |
|---:|---|
| 19¾ | pounds sheet brass. |
| 2 | brass clamps. |
| 37½ | pounds copper. |
| 15,694 | horse-shoes. |
| 644 | pounds bar iron. |
| 1,448 | pounds horse-shoe nails. |
| 940 | pounds iron nails. |
| 305 | padlocks. |
| 60 | brass rivets and burrs. |
| 147½ | pounds brass rivets and burrs. |
| 618½ | pounds copper rivets and burrs. |
| 85½ | pounds iron rivets and burrs. |
| 134 | gross brass screw pins. |
| $203\frac{7}{12}$ | gross brass screws. |
| 29½ | gross iron screws. |
| 421 | pounds steel. |
| 11,200 | copper tacks. |
| 1 | paper copper tacks. |
| 33¼ | pounds copper tacks. |
| 3,196,400 | iron tacks. |
| 12 | papers iron tacks. |
| 99¾⅛ | pounds iron tacks. |
| 40 | pounds toe-calks. |
| 40 | pounds copper wire. |
| 10 | pounds iron wire. |
| 70 | pounds zinc. |

### LEATHER, ETC.

| | |
|---|---|
| 800 | sides bridle leather. |
| 20½ | feet collar leather. |
| 23,589 | pounds harness leather. |
| 171½ | quarts leather blacking. |
| 28½ | pounds leather polish. |
| 303¾ | pounds black wax. |
| 13 | ounces bristles. |
| 102 | boxes ingredients for leather blacking. |

### LUMBER, ETC.

| | |
|---|---|
| 1,600 | feet boards. |
| 1,482 | feet scantling. |
| 491 | feet timber. |

### CLEANING, HEATING, AND LIGHTING.

| | |
|---|---|
| 12 | bath bricks. |
| 108 | corn brooms. |
| 9 | dusting brushes. |
| 5 | feather dusting brushes. |
| 122 | button brushes. |
| 52 | button sticks. |
| 37 | pounds candles. |
| 113 | chamois skins. |
| 10 | boxes cleaning material. |
| 20 | cleaning plates. |
| 14,250 | pounds coal. |
| 45½ | quires crocus cloth. |
| 5 | pounds emery. |
| 1,035⅚ | quires emery cloth. |
| 3½ | quires emery paper. |
| 2 | lanterns. |
| 104½ | ounces scouring material. |
| 6 | pounds pomade. |
| 426 | pounds rottenstone. |
| 62½ | quires sandpaper. |
| 25 | pounds bar soap. |
| 2,483½ | pounds castile soap. |
| 275 | pounds sponge. |
| 610 | papers tripoli. |
| 298 | ounces whiting. |
| 195 | pounds whiting. |

### MATERIAL FOR OFFICE USE.

| | |
|---|---|
| 8 | half-boxes blacking for stencil outfit. |
| 78 | instruction books. |
| 1 | stencil brush. |
| 25 | pounds hektograph composition. |
| 352 | ounces indelible ink. |
| 1 | hektograph. |
| 6 | door mats. |
| 2 | marking outfits. |
| 2 | sets marking outfit screws. |

| | |
|---|---|
| 25 | boxes stencil paste. |
| 2 | seal stamps. |
| 110 | pounds sealing-wax. |
| 20 | stencil plates, letters, and figures, sets. |
| 3 | stencil outfits (sets). |

### LABORATORY STORES.

| | |
|---|---|
| 13 | gallons alcohol. |
| 81½ | pounds beeswax. |
| 10 | pounds borax. |
| 5 | pounds chalk. |
| 15 | pounds glue. |
| 23 | pounds straw board. |
| 50 | pounds tallow. |
| 1,172 | pounds Japan wax. |
| 5 | gallons whisky. |

### OILS, PAINTS, ETC.

| | |
|---|---|
| 3 | quarts browning mixture. |
| 65 | gallons coal-tar. |
| 25 | quarts cosmolubric. |
| 20 | gallons Japan drier. |
| 50 | gallons lacker. |
| 20 | pounds lampblack. |
| 25 | pounds black lead. |
| 125 | pounds white lead. |
| 12 | pounds extract logwood. |
| 121⅝ | gallons cosmoline oil. |
| 4,418 | pounds harness oil. |
| 20 | gallons kerosene oil. |
| 5 | gallons lard oil. |
| 268⅝ | gallons linseed oil. |
| 95½ | gallons neat's-foot oil. |
| 40 | gallons neutral oil. |
| 568¾ | gallons sperm oil. |
| 517½ | pounds black paint. |
| 890 | pounds brown paint. |
| 75 | pounds green paint. |
| 637½ | pounds lead-color paint. |
| 1,764 | pounds olive paint. |
| 5 | pounds vermillion paint. |
| 10 | pounds putty. |
| 202 | gallons turpentine. |
| 5 | pounds umber. |

### MISCELLANEOUS.

| | |
|---|---|
| 6 | tool bags. |
| 12 | metallic powder barrels. |
| 12 | chair bottoms. |
| 5 | cleaning material boxes. |
| 9 | boxes for forge and battery wagon stores. |
| 14 | packing boxes. |
| 8 | reloading tool boxes. |
| 7 | tin cans. |

| | |
|---|---|
| 22 | chamois skin saber cases. |
| 289 | arm chests. |
| 2 | tool chests. |
| 184 | cans axle grease. |
| 130 | pounds axle grease. |
| 215 | pounds wheel grease. |
| 12 | halliards. |
| 450 | barrel hoops. |
| 3 | powder kegs. |
| 300 | pounds packing paper. |
| 177 | pounds petroleum paper. |
| 110 | pounds stencil paper. |

## MACHINES AND PARTS OF MACHINES.

| | |
|---|---|
| 6 | crusher pressure gauges. |
| 100 | cylinder pressure gauges. |
| 1 | star gauge. |
| 1 | engine lathe. |
| 1 | milling machine. |
| 1 | planing machine. |
| 1 | profiling machine. |
| 1 | inspecting mirror. |
| 3 | dies for gas-check pad. |

## TOOLS.

| | |
|---|---|
| 11 | anvils. |
| 149 | aprons. |
| 8 | augers. |
| 1,144 | awls. |
| 219 | awl handles. |
| 24 | patent awl handles. |
| 19 | axes. |
| 48 | ax handles. |
| 69 | assorted bits. |
| 25 | sets of bits. |
| 5 | lead-punching blocks. |
| 1 | iron boiler. |
| 5 | shoeing boxes. |
| 10 | braces. |
| 246 | assorted brushes. |
| 10 | assorted buckets. |
| 7 | buttresses. |
| 1 | calipers. |
| 7 | chalk lines. |
| 102 | assorted chisels. |
| 7 | saddlers' clamps. |
| 23 | claw tools. |
| 6 | clinching irons. |
| 40 | compasses. |
| 13 | iron creasers. |
| 87 | wooden creasers. |
| 12 | dies. |
| 1 | die stock with dies. |
| 5 | dust pans. |

| | |
|---|---|
| 63 | edged tools. |
| 1, 147 | files. |
| 193 | file handles. |
| 6 | cavalry forges. |
| 2 | forge chests. |
| 4 | fullers. |
| 1 | funnel. |
| 3 | gauges. |
| 16 | draw gauges. |
| 24 | gimlets. |
| 2 | glue pots. |
| 2 | gouges. |
| 2 | grindstones. |
| 1 | grindstone arbor and crank. |
| 1 | grindstone stand. |
| 220 | assorted hammers. |
| 13 | sledge hammers. |
| 39 | hammer handles. |
| 10 | hatchets. |
| 19 | hardies. |
| 8 | saddlers' horses. |
| 367 | assorted knives. |
| 13 | gauge knives. |
| 15 | splitting knives. |
| 78 | mallets. |
| 7 | mauls. |
| 1 | nail claw. |
| 5, 928 | needles. |
| 96 | nippers. |
| 4 | oil cans. |
| 3 | oil droppers. |
| 34 | oil stones. |
| 1 | sewing palm. |
| 12 | carpenters' pencils. |
| 2 | pickaxes. |
| 8 | pickax handles. |
| 81 | pincers. |
| 16 | planes. |
| 33 | pliers. |
| 12 | pointing stakes. |
| 2 | pokers. |
| 26 | pricking carriages. |
| 83 | pricking wheels. |
| 19 | pritchels. |
| 153 | assorted punches. |
| 5 | nail punches and clinch knives. |
| 49 | spring punches. |
| 1, 003 | rasps. |
| 7 | reaping hooks. |
| 2 | riveting irons. |
| 5 | rivet sets. |
| 2 | rounding irons. |
| 64 | rules. |
| 62 | sandstones. |
| 14 | sash tools. |
| 10 | saws. |

| | |
|---|---|
| 3 | saw-sets. |
| 2 | scrapers. |
| 50 | screw-drivers. |
| 1 | scriber. |
| 16 | scythes. |
| 4 | scythe snaths. |
| 12 | scythe stones. |
| 67 | shears. |
| 2 | pairs rubber shoes. |
| 19 | shovels. |
| 15 | slickers. |
| 18 | pairs magazine slippers. |
| 12 | spades. |
| 2 | spokeshaves. |
| 24 | squares. |
| 28 | taps. |
| 38 | thimbles. |
| 15 | ticklers. |
| 106 | tongs. |
| 6 | tuyere irons. |
| 35 | vises. |
| 2 | watering pots. |
| 2 | wheelbarrows. |
| 54 | wrenches. |

# APPENDIX 4.

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### *STATEMENT OF ORDNANCE, ORDNANCE STORES, ETC., DISTRIBUTED TO THE MILITIA FROM JULY* 1, 1887, *TO JUNE* 30, 1888, *UNDER SECTIONS* 1661 *AND* 1667, *REVISED STATUTES UNITED STATES.*

## CLASS I.

7 3-inch wrought-iron guns.
6 Gatling guns, 10 barrels, long, caliber .45.

## CLASS II.

7 carriages and limbers for 3-inch guns.
6 carriages and limbers for Gatling guns, caliber .45.
2 carriages and limbers (metallic) for Gatling guns, caliber .45.
2 caissons and limbers for 3-inch guns.

## CLASS III.

6 fuse blocks.
6 fuse cutters.
2 fuse gouges.
2 fuse wrenches.
29 gunners' haversacks.
7 gunners' gimlets.
6 gunners' pincers.
25 handspikes, trail.
4 harness sacks.
84 lanyards.
47 priming wires.
6 prolonges.
12 pole-pads.
15 paulins, 12 by 15 feet.
6 pendulum hausses.
6 pendulum hausse pouches.
4 pendulum hausse seats.
21 sets artillery harness, 2 horses, lead.
34 sets artillery harness, 2 horses, wheel.
8 sponge-buckets, iron.
10 sponges and rammers, 6-pounder gun.
22 sponges and rammers, 3-inch rifle.
10 sponge covers, 6-pounder gun.
32 sponge covers, 3-inch rifle.
12 sponge heads, 3-inch rifle.
2 sponge heads, 12-pounder mountain howitzer.

| | |
|---|---|
| 84 | thumbstalls. |
| 1 | tar bucket, iron. |
| 33 | tube-pouches. |
| 6 | tow hooks. |
| 15 | tompions. |
| 17 | vent-covers. |
| 6 | vent-punches. |
| 24 | worms and staves. |
| 2 | water buckets. |

### IMPLEMENTS FOR GATLING GUNS.

| | |
|---|---|
| 111 | feed cases. |
| 66 | feed magazines. |
| 12 | gun covers. |
| 8 | handspikes. |
| 6 | hammers, riveting. |
| 8 | oilers. |
| 4 | sight cases. |
| 6 | screw wrenches. |

### CLASSES IV AND V.

| | |
|---|---|
| 70 | 10-inch shot. |
| 34 | 10-inch shell. |
| 25 | 10-inch mortar shell. |
| 13 | 12-pounder canister, filled and fixed. |
| 12 | 12-pounder case-shot, filled and fixed. |
| 25 | 6-pounder case-shot, filled and fixed. |
| 25 | 6-pounder canister, filled and fixed. |
| 20 | 3-inch shot. |
| 20 | 3-inch shot, fully prepared. |
| 20 | 3-inch time shell, fully prepared. |
| 25 | 3-inch case-shot, filled and fixed. |
| 20 | 3-inch case-shot, fully prepared. |
| 25 | 3-inch canister, filled and fixed. |
| 20 | 3-inch canister, fully prepared. |
| 100 | 3-inch shell. |
| 200 | 3-inch Parrott shell. |
| 100 | 3-inch percussion shell, fully prepared. |
| 145 | 3-inch Hotchkiss time fuse shell. |
| 25 | 3-inch Hotchkiss percussion shell, fully prepared. |
| 80 | 3-inch Hotchkiss case shot. |

### CLASS VI.

| | |
|---|---|
| 8,526 | Springfield rifles, caliber. 45. |
| 216 | Springfield cadet rifles, caliber. 45. |
| 371 | Springfield carbines, caliber. 45. |
| 218 | Colt's revolvers, caliber. 45. |
| 201 | officers' swords. |
| 14 | non-commissioned officers' swords. |
| 4 | musicians' swords. |
| 56 | sabers, light artillery |
| 528 | sabers, light cavalry. |
| 26 | sabers, cavalry officers. |

| | |
|---|---|
| 1 | sword, major-general. |
| 1 | sword, brigadier-general. |
| 170 | bayonets. |

### CLASS VII.

| | |
|---|---|
| 7,903 | combination screw-drivers. |
| 7,903 | headless shell extractors. |

### HORSE EQUIPMENTS FOR CAVALRY.

| | |
|---|---|
| 649 | curb bridles, cavalry. |
| 255 | pairs spurs and straps. |
| 500 | cavalry saddles, leather. |
| 80 | cavalry saddles, rawhide. |
| 347 | artillery saddle blankets. |
| 364 | cavalry saddle blankets. |
| 30 | saddle cloths, hair. |
| 31 | saddle cloths, officers. |
| 75 | pairs sweat-leathers. |
| 211 | halters and straps. |
| 161 | pairs saddle-bags. |
| 1 | bridle, watering. |
| 6 | horse brushes. |
| 41 | nose-bags. |
| 41 | lariats. |
| 41 | picket-pins. |
| 1 | crupper. |
| 1 | horse-cover. |
| 1 | link and snap. |
| 1 | side-line. |
| 1 | stirrup with hood. |
| 50 | bridle reins. |

### INFANTRY EQUIPMENTS.

| | |
|---|---|
| 5,277 | bayonet scabbards. |
| 2,500 | blanket bags. |
| 2,500 | pairs blanket-bag shoulder straps. |
| 2,500 | pairs coat straps. |
| 1,450 | canteens and straps. |
| 150 | cartridge belts and plates. |
| 5,468 | cartridge boxes. |
| 295 | cartridge belts, woven. |
| 9,556 | gun slings. |
| 6,650 | haversacks and straps. |
| 7,145 | waist belts and plates. |
| 700 | waist belts. |
| 10 | waist belts and plates, non-commissioned officers. |
| 7 | shoulder belts and plates, non-commissioned officers. |
| 2,200 | meat cans. |

| | |
|---|---|
| 720 | tin cups. |
| 920 | knives. |
| 920 | forks. |
| 1,108 | spoons. |

### ARTILLERY ACCOUTERMENTS.

| | |
|---|---|
| 90 | artillery saber belts and plates. |

### CAVALRY EQUIPMENTS.

| | |
|---|---|
| 571 | carbine slings. |
| 571 | carbine sling swivels. |
| 200 | carbine boots and straps. |
| 155 | pistol holsters. |
| 52 | pistol cartridge pouches (cap pouches). |
| 890 | saber belts and plates. |
| 158 | saber knots. |
| 136 | saber attachments. |
| 400 | cartridge belts. |
| 24 | sword belts and plates, officer's. |

### CLASS VIII.

| | |
|---|---|
| 125 | blank cartridges, 12-pounder gun. |
| 300 | blank cartridges, 10-pounder gun. |
| 800 | blank cartridges, 6-pounder gun. |
| 2,000 | blank cartridges, 3-inch rifle. |
| 1,258,000 | rifle ball cartridges, caliber .45. |
| 714,000 | rifle ball cartridges, caliber .50. |
| 425,000 | rifle blank cartridges, caliber .45. |
| 9,000 | rifle blank cartridges, caliber .50. |
| 14,000 | carbine ball cartridges, caliber .45. |
| 56,000 | revolver ball cartridges, caliber .45. |
| 1,000 | revolver blank cartridges, caliber .45. |
| 1,000 | primed cartridge shells, caliber .45. |
| 20,000 | lubricated rifle bullets. |
| 90,000 | round balls (140 grains) caliber .45. |
| 20,500 | cartridge primers. |
| 14,920 | friction primers. |
| 25 | fuses, time, metallic. |
| 300 | fuses, time, paper. |
| 150 | fuses, time, wood. |
| 125 | fuse plugs, time. |
| 105 | fuse plugs, percussion. |
| 25 | cartridge bags, 10-inch siege mortar. |
| 50 | cartridge bags, 10-inch Rodman gun. |
| 500 | pounds cannon powder. |
| 600 | pounds mortar powder. |
| 7 | pounds musket powder. |
| 200 | pounds small-arms powder. |

### MISCELLANEOUS.

| | |
|---|---|
| 466 | arm-chests. |
| 25 | adjustable chargers. |
| 40 | boxes cleaning material. |
| 12 | chamois-skins. |
| 371 | jointed ramrods. |
| 200 | marksman's buttons. |
| 301,000 | pasters. |

| | |
|---|---|
| 4,600 | paper targets. |
| 12 | padlocks for limbers and chests. |
| 2 | pounds browning mixture. |
| 5 | pounds harness oil. |
| 10 | pounds polish for leather. |
| 2 | pounds scouring material. |
| 2 | quires emery-cloth. |
| 2 | quires emery-paper. |
| 2 | quires sand-paper. |
| 10 | sharpshooters' badges. |
| 1 | set reloading tools. |
| 8,557 | wiping-rods, wooden. |
| 2 | resizing dies, extra. |

### PARTS OF SPRINGFIELD RIFLE, CALIBER .45.

| | |
|---|---|
| 75 | bridles. |
| 75 | bridle screws. |
| 4 | breech screws. |
| 42 | breech-blocks. |
| 20 | breech-block cap-screws. |
| 5 | butt plates. |
| 220 | butt-plate screws. |
| 6 | band springs. |
| 40 | bayonet-clasp screws. |
| 70 | cam latches. |
| 512 | cam-latch springs. |
| 600 | ejector springs. |
| 450 | ejector-spring spindles. |
| 1,300 | extractors. |
| 1,420 | front sights. |
| 1,400 | front-sight covers. |
| 1,420 | front-sight pins. |
| 3,050 | firing pins. |
| 700 | firing-pin screws. |
| 10 | guard bows. |
| 20 | guard-bow nuts. |
| 250 | guard-bow swivels. |
| 225 | guard-bow swivel screws |
| 3 | guard plates. |
| 7 | guard screws. |
| 235 | hammers. |
| 236 | hinge pins. |
| 100 | hinge-pin studs. |
| 1,431 | lower bands. |
| 143 | locks. |
| 45 | lock-plates. |
| 235 | mainsprings. |
| 275 | mainspring swivels. |
| 210 | mainspring swivel rivets. |
| 1,518 | rear sights. |
| 36 | rear-sight slides. |
| 30 | rear-sight base screws. |
| 20 | rear-sight joint screws. |
| 40 | rear-sight leaf screws. |
| 311 | ramrods. |

| | |
|---|---|
| 60 | ramrod stops. |
| 37 | stacking swivels. |
| 1,175 | sears. |
| 100 | sear screws. |
| 650 | sear springs.. |
| 500 | sear-spring screws. |
| 523 | side screws. |
| 100 | side-screw washers. |
| 444 | spring vises. |
| 81 | stocks, complete. |
| 200 | stocks (wood part). |
| 22 | stocks, assembled. |
| 573 | tumblers. |
| 906 | tumbler screws. |
| 2,448 | tumbler punches. |
| 307 | tang screws. |
| 35 | thumb-pieces. |
| 150 | upper bands. |
| 25 | upper-band screws. |

### PARTS OF SPRINGFIELD CARBINE, CALIBER .45.

| | |
|---|---|
| 5 | swivel bars. |
| 5 | swivel rings. |

### PARTS OF COLT'S REVOLVER, CALIBER .45.

| | |
|---|---|
| 210 | bolt springs. |
| 10 | firing pins. |
| 10 | gate springs. |
| 10 | gate catches. |
| 25 | hands. |
| 25 | hand-springs. |
| 10 | hammers. |
| 10 | hammer cams. |
| 10 | hammer screws. |
| 210 | sear springs. |

### TOOLS, ETC.

| | |
|---|---|
| 1 | anvil, smiths'. |
| 2 | aprons, leather. |
| 4 | axes, felling. |
| 6 | shovels, smiths'. |
| 6 | shovels, long-handled. |
| 6 | spades. |

# APPENDIX 5.

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*STATEMENT OF ORDNANCE, ORDNANCE STORES, ETC., DISTRIBUTED TO COLLEGES FROM JULY* 1, 1887, *TO JUNE* 30, 1888, *UNDER SECTION* 1225 *REVISED STATUTES UNITED STATES, AS AMENDED BY ACT APPROVED JULY* 5, 1876.

## CLASS I.

| | |
|---|---|
| 1 | 6-pounder bronze gun. |

## CLASS VI.

| | |
|---|---|
| 500 | Springfield cadet rifles, caliber .45. |
| 15 | swords, non-commissioned officers'. |

## CLASS VII.

| | |
|---|---|
| 700 | bayonets cabbards. |
| 700 | cartridge boxes. |
| 700 | waist belts and plates. |
| 20 | waist belts and plates, non-commissioned officers'. |
| 24 | shoulder belts and plates, non-commissioned officers'. |
| 23 | frogs, sliding, non-commissioned officers'. |

## CLASS VIII.

| | |
|---|---|
| 250 | blank cartridges for 12-pounder gun. |
| 400 | blank cartridges for 10-pounder gun. |
| 500 | blank cartridges for 6-pounder gun. |
| 1,250 | blank cartridges for 3-inch gun. |
| 28,000 | carbine ball cartridges, caliber .45. |
| 29,000 | carbine blank cartridges, caliber .45. |
| 1,000 | carbine ball cartridges, caliber .50. |
| 1,000 | carbine blank cartridges, caliber .50. |
| 1,000 | rifle ball cartridges, caliber .50. |
| 3,000 | rifle blank cartridges, caliber .50. |
| 6,900 | friction primers. |

# APPENDIX 6.

## *STATEMENT OF ORDNANCE STORES ISSUED TO THE EXECUTIVE DEPARTMENTS DURING THE YEAR ENDED JUNE* 30, 1888, *UNDER THE PROVISIONS OF THE ACT OF MARCH* 3, 1879.

### TO THE TREASURY DEPARTMENT.

| | |
|---:|---|
| 2 | Gatling guns, caliber .45. |
| 5 | carriages, without limbers, for Gatling gun, caliber .45. |
| 10 | Springfield rifles. |
| 8 | Springfield carbines. |
| 10 | bayonet scabbards. |
| 10 | cartridge boxes. |
| 10 | gun slings. |
| 10 | waist belts and plates. |
| 16,600 | rifle ball cartridges. |
| 600 | carbine ball cartridges. |
| 500 | hand grenades. |
| 1 | arm chest. |

### TO THE POST-OFFICE DEPARTMENT.

| | |
|---:|---|
| 409 | Colt's revolvers. |
| 4,800 | revolver ball cartridges. |
| 4 | arm chests. |

# APPENDIX 7.

## *REPORT OF ACTION TAKEN UNDER THE ACT OF MARCH* 3, 1881, *DURING THE FISCAL YEAR ENDED JUNE* 30, 1888.

### SOLD TO E. I. DU PONT DE NEMOURS & CO.

| | | |
|---|---|---|
| 1887. | | |
| Sept. 20. | 103 pounds brown prismatic powder (scrap), at 8 cents per pound. .. | $8.24 |

### PURCHASED FROM E. I. DU PONT DE NEMOURS & CO.

| | | |
|---|---|---|
| 1887. | | |
| Nov. 29. | 300 pounds square powder, at 25 cents per pound ...................... | 75.00 |

# APPENDIX 8.

## *SHOWING STATIONS AND DUTIES OF THE OFFICERS OF THE ORDNANCE DEPARTMENT ON OCTOBER* 1, 1888.

| Rank and name. | Duty. | Address. |
|---|---|---|
| BRIGADIER-GENERAL. | | |
| Stephen V. Benét | Chief of Ordnance | Washington, D. C. |
| COLONELS. | | |
| 1. S. Crispin, brevet | Commanding the Benicia Arsenal | Benicia, Cal. |
| 2. T. G. Baylor, brevet | Commanding the Rock Island Arsenal | Rock Island, Ill. |
| 3. J. M. Whittemore | Commanding the Watervliet Arsenal | West Troy, N. Y. |
| LIEUTENANT-COLONELS. | | |
| 1. A. R. Buffington | Commanding the National Armory | Springfield, Mass. |
| 2. D. W. Flagler, brevet | Commanding the Frankford Arsenal | Philadelphia, Pa. |
| 3. A. Mordecai, brevet | Commanding the New York Arsenal, President of the Ordnance Board, and President of Board for Testing Rifled Cannon, etc. | Governor's Island, New York City. Post-office box 1449. |
| 4. F. H. Parker, brevet | Commanding the Watertown Arsenal, and Member of Board for Testing Rifled Cannon, etc. | Watertown, Mass. |
| MAJORS. | | |
| 1. J. P. Farley | Member of the Ordnance Board, and Member of Board for Testing Rifled Cannon, etc. | Governor's Island, New York City. Post-office box 1449. |
| 2. L. S. Babbitt | Commanding the San Antonio Arsenal, and Chief Ordnance Officer Department of Texas. | San Antonio, Tex. |
| 3. W. A. Marye | Assistant National Armory | Springfield, Mass. |
| 4. I. Arnold, jr | Commanding the Fort Monroe Arsenal | Fort Monroe, Va. |
| 5. C. Comly | Commanding the Indianapolis Arsenal | Indianapolis, Ind. |
| 6. J. R. McGinness, brevet | Assistant, Rock Island Arsenal | Rock Island, Ill. |
| 7. G. W. McKee, brevet | Commanding the Allegheny Arsenal | Pittsburgh, Pa. |
| 8. F. H. Phipps | Commanding the U. S. Powder Depot | Dover, N. J. |
| 9. J. W. Reilly | Commanding the Augusta Arsenal | Augusta, Ga. |
| 10. J. A. Kress, brevet | Assistant, Benicia Arsenal | Benicia, Cal. |
| CAPTAINS. | | |
| 1. O. E. Michaelis, brevet | Commanding the Kennebec Arsenal | Augusta, Me. |
| 2. C. E. Dutton | On duty under the Interior Department | Geological Survey, Washington, D. C. |
| 3. J. G. Butler | Commanding the Saint Louis Powder Depot. | Jefferson Barracks, Mo. |
| 4. C. Bryant | Assistant, Frankford Arsenal | Philadelphia, Pa. |
| 5. A. L. Varney | Assistant, Rock Island Arsenal | Rock Island, Ill. |
| 6. J. C. Clifford | Assistant, National Armory | Springfield, Mass. |
| 7. J. E. Greer | Member of the Ordnance Board, and Member of Board for Testing Rifled Cannon, etc. | Governor's Island, New York City. Post-office box 1449. |
| 8. J. Pitman | Commanding the Fort A. Lincoln Ordnance Depot, and Chief Ordnance Officer Department of Dakota. | Fort A. Lincoln, Dak. |
| 9. C. Shaler | Assistant, Watervliet Arsenal | West Troy, N. Y. |
| 10. H. Metcalfe | Instructor of Ordnance and Gunnery, U. S. Military Academy. | West Point, N. Y. |

*SHOWING STATIONS AND DUTIES OF THE OFFICERS OF THE ORDNANCE DEPARTMENT*—Continued.

| Rank and name. | Duty. | Address. |
|---|---|---|
| 11. W. S. Starring | Commanding the Vancouver Barracks Ordnance Depot, and Chief Ordnance Officer Department of the Columbia. | Vancouver Barracks, Wash. Ter. |
| 12. C. S. Smith | Principal Assistant in the Ordnance Bureau. | Washington, D. C. |
| 13. S. E. Blunt | Inspector of Rifle Practice at the headquarters of the Army. | Washington, D. C. |
| 14. F. Heath | Assistant, Watervliet Arsenal | West Troy, N. Y. |
| 15. D. M. Taylor | On special duty in the office of the Adjutant-General. | Washington, D. C. |
| 16. D. A. Lyle | On foundry duty; Member of Board on Life-Saving Apparatus, etc., under the Secretary of the Treasury, and Member of Board for testing Rifled Cannon, etc. | Boston, Mass. Post-office box 2253. |
| 17. J. Rockwell, jr | Assistant, Rock Island Arsenal | Rock Island, Ill. |
| 18. J. C. Ayres | Assistant, Watervliet Arsenal | West Troy, N. Y. |
| 19. M. W. Lyon | Commanding the Cheyenne Ordnance Depot, and Chief Ordnance Officer Department of the Platte. | Cheyenne, Wyo. Ter. |
| 20. C. W. Whipple | Commanding the Fort Leavenworth Ordnance Depot, and Chief Ordnance Officer Department of the Missouri. | Fort Leavenworth, Kans. |
| 21. A. H. Russell | Assistant, Frankford Arsenal | Philadelphia, Pa. |
| 22. R. Birnie, jr | On duty in the office of the Chief of Ordnance. | Washington, D. C. |
| 23. I. MacNutt | Assistant, Watertown Arsenal | Watertown, Mass. |
| 24. C. C. Morrison | Assistant to the Ordnance Board | Governor's Island, New York City. Post-office box 1449. |
| 25. F. Baker | Assistant, Frankford Arsenal | Philadelphia, Pa. |
| 26. O. B. Mitcham | Assistant Instructor of Ordnance and Gunnery, U. S. Military Academy. | West Point, N. Y. |
| FIRST LIEUTENANTS. | | |
| 1. H. D. Borup | On foundry duty | Boston, Mass. Post-office box 2253. |
| 2. L. L. Bruff | Assistant, Watervliet Arsenal | West Troy, N. Y. |
| 3. C. H. Clark | Assistant, National Armory | Springfield, Mass. |
| 4. William Crozier | On duty in the office of the Chief of Ordnance. | Washington, D. C. |
| 5. W. B. Gordon | Assistant, Watervliet Arsenal | West Troy, N. Y. |
| 6. F. E. Hobbs | On foundry duty | Station G, Philadelphia, Pa. |
| 7. D. A. Howard | Assistant to the Ordnance Board | Governor's Island, New York City. Post-office box 1449. |
| 8. S. E. Stuart | On foundry duty | Station G, Philadelphia, Pa. |
| 9. J. Walker Benét | Assistant, National Armory | Springfield, Mass. |
| 10. W. W. Gibson | On foundry duty | Station G, Philadelphia, Pa. |
| ORDNANCE STOREKEEPERS—CAPTAINS. | | |
| A. S. M. Morgan | On duty, Allegheny Arsenal | Pittsburgh, Pa. |
| W. H. Rexford | On duty, Indianapolis Arsenal | Indianapolis, Ind. |
| D. J. Young | On leave | Washington, D. C. |
| M. J. Grealish | On duty, Augusta Arsenal | Augusta, Ga. |
| V. McNally | On duty in the office of the Chief of Ordnance. | Washington, D. C. |

# APPENDIX 9.

## *ANNUAL REPORT OF INSPECTOR OF ORDNANCE AT MIDVALE STEEL WORKS.*

MIDVALE STEEL WORKS,
*Philadelphia, Pa., July* 30, 1888.

SIR: I have the honor to submit the following report upon the work done for the Ordnance Department by The Midvale Steel Company during the fiscal year ending June 30, 1888:

During this period the company continued the fabrication of forgings for 3.2-inch steel breech-loading field guns, under their contract of February 19, 1887, for twenty-five sets of such forgings; and, in addition, furnished the Department a few small forgings for parts of breech mechanism which were required for immediate use.

The forgings for field guns have been completed and the contract closed; they are similar to those which have heretofore been made for such guns, and which have been so frequently described in former reports that no further account of them seems necessary at this time. The physical qualities of the accepted forgings have been excellent, as will be seen by examination of the subjoined tables giving the results of test of specimens from those forgings accepted during the fiscal year.

***Results of tensile test of tangential specimens from ends of tubes for* 3.2*-inch steel breech-loading field guns.***

[Length of specimen, 2 inches; sectional area, 0.2 of a square inch.]

| Number of tube. | Breech of muzzle. | Number of specimen. | Elastic limit per square inch of original section. | Elongation per inch under strain at elastic limit. | Tensile strength per square inch of original section. | Elongation after rupture. | Reduction of area after rupture. |
|---|---|---|---|---|---|---|---|
| | | | *Pounds.* | *Inch.* | *Pounds.* | *Per cent.* | *Per cent.* |
| 30 | Breech ....... | 3 | 48,000 | .001600 | 86,300 | 25.00 | 37.1 |
| 30 | ....do......... | 4 | 47,000 | .001450 | 85,450 | 27.00 | 49.1 |
| 30 | Muzzle....... | 3 | 47,000 | .001750 | 86,900 | 22.50 | 49.1 |
| 30 | ....do......... | 4 | 49,000 | .001800 | 85,850 | 20.50 | 49.1 |
| 31 | Breech....... | *1 | 49,000 | .001850 | 86,050 | 18.00 | 27.4 |
| 31 | ....do......... | *2 | 50,000 | .001800 | 87,400 | 15.00 | 23.9 |
| 31 | Muzzle....... | *1 | 48,000 | .001650 | 85,800 | 23.50 | 37.1 |
| 31 | ....do......... | *2 | 48,000 | .001650 | 87,050 | 21.00 | 43.3 |
| 31 | Breech....... | 3 | 50,000 | .001700 | 84,600 | 24.50 | 37.1 |
| 31 | ....do......... | 4 | 49,000 | .001650 | 82,550 | 24.50 | 43.3 |
| 31 | Muzzle....... | 3 | 50,000 | .001750 | 85,900 | 21.00 | 46.2 |
| 31 | ....do......... | 4 | 48,000 | .001500 | 84,900 | 21.00 | 49.1 |
| 34 | Breech....... | 3 | 48,000 | .001550 | 86,550 | 19.00 | 43.3 |
| 34 | ....do......... | 4 | 50,000 | .001850 | 89,000 | 23.00 | 43.3 |
| 34 | Muzzle....... | 3 | 52,000 | .001800 | 90,550 | 20.50 | 46.2 |
| 34 | ....do......... | 4 | 45,000 | .001650 | 84,850 | 20.50 | 46.2 |
| 36 | Breech....... | 1 | 43,000 | .001400 | 80,100 | 25.50 | 46.2 |

* Not accepted on these results; retempered and annealed.

*Results of tensile strength of tangential specimens from ends of tubes, etc.*—Continued.

| Number of tube. | Breech of muzzle. | Number of specimen. | Elastic limit per square inch of original section. | Elongation per inch under strain at elastic limit. | Tensile strength per square inch of original section. | Elongation after rupture. | Reduction of area after rupture. |
|---|---|---|---|---|---|---|---|
| | | | *Pounds.* | *Inch.* | *Pounds.* | *Per cent.* | *Per cent.* |
| 36 | Breech | 2 | 43,000 | .001400 | 81,950 | 25.50 | 40.3 |
| 36 | Muzzle | 1 | 48,000 | .001550 | 84,500 | 24.50 | 43.3 |
| 36 | ....do | 2 | 47,000 | .001500 | 81,900 | 20.00 | 46.2 |
| 37 | Breech | 1 | 47,000 | .001550 | 88,900 | 22.00 | 43.3 |
| 37 | ....do | 2 | 48,000 | .001650 | 87,600 | 21.50 | 43.3 |
| 37 | Muzzle | 1 | 43,000 | .001500 | 80,700 | 25.00 | 49.1 |
| 37 | ....do | 2 | 44,000 | .001550 | 82,950 | 22.50 | 49.1 |
| 38 | Breech | 3 | 49,000 | .001600 | 88,550 | 20.50 | 34.0 |
| 38 | ....do | 4 | 48,000 | .001700 | 87,900 | 20.00 | 30.7 |
| 38 | Muzzle | 3 | 47,000 | .001650 | 82,300 | 24.00 | 40.3 |
| 38 | ....do | 4 | 46,000 | .001500 | 82,100 | 24.00 | 40.3 |
| 39 | Breech | 3 | 44,000 | .001500 | 84,050 | 25.00 | 49.1 |
| 39 | ....do | 4 | 44,000 | .001500 | 83,050 | 26.50 | 51.9 |
| 39 | Muzzle | 3 | 44,000 | .001500 | 80,400 | 26.50 | 46.2 |
| 39 | ....do | 4 | 45,000 | .001450 | 81,000 | 25.50 | 46.2 |
| 40 | Breech | *1 | 50,000 | .001700 | 87,150 | 20.00 | 30.7 |
| 40 | ....do | *2 | 49,000 | .001650 | 86,050 | 22.50 | 46.2 |
| 40 | Muzzle | *1 | 46,000 | .001700 | 87,900 | 20.00 | 37.1 |
| 40 | ....do | *2 | 42,000 | .001550 | 81,850 | 23.00 | 37.1 |
| 40 | Breech | *3 | 43,000 | .001500 | 83,450 | 25.00 | 43.3 |
| 40 | ....do | *4 | 44,000 | .001600 | 82,550 | 19.50 | 30.7 |
| 40 | Muzzle | *3 | 43,000 | .001500 | 83,700 | 19.50 | 43.3 |
| 40 | ....do | †4 | 46,000 | .001600 | 87 850 | 19.00 | 87.1 |
| 40 | Breech | †5 | 55,000 | .001800 | 87,350 | 19.00 | 37.1 |
| 40 | ....do | †6 | 53,000 | .001750 | 87,550 | 17.50 | 37.1 |
| 40 | Muzzle | †5 | 50,000 | .001600 | 90,400 | 17.00 | 37.1 |
| 40 | ....do | 6 | 50,000 | .001650 | 89,900 | 18.00 | 43.3 |
| 41 | Breech | 1 | 50,000 | .001800 | 92,050 | 19.50 | 40.3 |
| 41 | ....do | 2 | 51,000 | .001750 | 89,300 | 23.50 | 43.3 |
| 41 | Muzzle | 1 | 45,000 | .001500 | 83,800 | 26.50 | 46.2 |
| 41 | ....do | 2 | 45,000 | .001450 | 85,100 | 23 00 | 37.1 |
| 43 | Breech | 9 | 47,000 | .001400 | 88,200 | 21.50 | 46.2 |
| 43 | ....do | 10 | 47,000 | .001550 | 85,450 | 26.00 | 46.2 |
| 43 | Muzzle | 9 | 48,000 | .001450 | 89,800 | 20.50 | 46.2 |
| 43 | ....do | 10 | 47,000 | .001550 | 88,650 | 21.00 | 49.1 |

* Not accepted on these results; retempered and annealed.
† Not accepted on these results; reannealed and then accepted without further test.

*Results of tensile test of tangential specimens from jackets for* 3.2-*inch steel breech-loading field guns.*

[Length of specimen, 2 inches; sectional area, 0.2 of a square inch.]

| Number of jacket. | Number of specimen. | Elastic limit per square inch of original section. | Elongation per inch under strain at elastic limit. | Tensile strength per square inch of original section. | Elongation after rupture. | Reduction of area after rupture. |
|---|---|---|---|---|---|---|
| | | *Pounds.* | *Inch.* | *Pounds.* | *Per cent.* | *Per cent.* |
| 27 | 5 | 52,000 | .001800 | 100,100 | 20.50 | 37.1 |
| 27 | 6 | 52,000 | .001750 | 99,150 | 21.00 | 37.1 |
| 40 | *1 | 48,000 | .001700 | 96,450 | 21.50 | 37.1 |
| 40 | *2 | 48,000 | .001650 | 95,400 | 20.00 | 37.1 |
| 40 | 3 | 55,000 | .001950 | 107,050 | 18.50 | 34.0 |
| 40 | 4 | 54,000 | .001950 | 104,450 | 19.00 | 37.1 |
| 44 | *1 | 46,000 | .001500 | 91,350 | 20.00 | 40.3 |
| 44 | *2 | 51,000 | .001750 | 95,600 | 15 00 | 20.5 |
| 44 | †3 | 54,000 | .001800 | 101,200 | 20.00 | 40.3 |
| 44 | †4 | 55,000 | .001950 | 101,950 | 15.00 | 20.5 |
| 44 | 5 | 52,000 | .001750 | 94,050 | 19.00 | 40.3 |
| 44 | 6 | 52,000 | .001800 | 95,050 | 17.00 | 27.4 |

* Not accepted on these results; retempered and annealed.
† Not accepted on these results; reannealed.

*Results of tensile test of tangential specimens from trunnion-hoops for* 3.2*-inch steel breech-loading field-guns.*

[Length of specimen, 2 inches; sectional area, 0.2 of a square inch.]

| Number of trunnion-hoop. | Number of specimen. | Elastic limit per square inch of original section. | Elongation per inch under strain at elastic limit. | Tensile strength per square inch of original section. | Elongation after rupture. | Reduction of area after rupture. |
|---|---|---|---|---|---|---|
| | | *Pounds.* | *Inch.* | *Pounds.* | *Per ct.* | *Per ct.* |
| 33 | *1 | 47,000 | .001650 | 91,800 | 21.50 | 37.1 |
| 33 | *2 | 46,000 | .001550 | 89,100 | 25.00 | 37.1 |
| 33 | 3 | 53,000 | .001700 | 100,900 | 16.00 | 27.4 |
| 33 | 4 | 50,000 | .001750 | 97,500 | 18.50 | 23.9 |
| 34 | *1 | 47,000 | .001500 | 89,950 | 21.50 | 34.0 |
| 34 | *2 | 47,000 | .001700 | 90,250 | 22.00 | 34.0 |
| 34 | †3 | 55,000 | .001900 | 100,300 | 18.00 | 27.4 |
| 34 | †4 | 52,000 | .001600 | 99,000 | 15.00 | 23.9 |
| 34 | 5 | 54,000 | .001800 | 96,050 | 18.50 | 30.7 |
| 34 | 6 | 52,000 | .001750 | 92,200 | 23.00 | 37.1 |
| 35 | *1 | 47,000 | .001600 | 92,550 | 19.50 | 34.0 |
| 35 | *2 | 49,000 | .001850 | 94,600 | 21.00 | 37.1 |
| 35 | 3 | 56,000 | .001950 | 102,600 | 21.00 | 37.1 |
| 35 | 4 | 54,000 | .001800 | 100,150 | 16.00 | 23.9 |
| 36 | *1 | 49,000 | .001650 | 92,750 | 21.00 | 40.3 |
| 36 | *2 | 47,000 | .001650 | 90,400 | 19.50 | 40.3 |
| 36 | 3 | 52,000 | .001800 | 95,550 | 20.50 | 37.1 |
| 36 | 4 | 57,000 | .001900 | 98,400 | 18.00 | 34.0 |
| 44 | *1 | 46,000 | .001600 | 88,800 | 21.50 | 37.1 |
| 44 | *2 | 47,000 | 001500 | 89,850 | 19.50 | 40.3 |
| 44 | 3 | 51,000 | .001800 | 97,300 | 18.50 | 34.0 |
| 44 | 4 | 55,000 | .001850 | 100.450 | 17.00 | 34.0 |
| 48 | 5 | 52,000 | .001700 | 95,850 | 24.50 | 34.0 |
| 48 | 6 | 53,000 | .001650 | 96,400 | 23.00 | 43.3 |

* Not accepted on these results; retempered and annealed.
† Not accepted on these results; reannealed.

The small breech mechanism forgings referred to were produced promptly, and were of satisfactory quality. The following list shows their nature:

Two forgings for gas-check cups for 5-inch rifle and two forgings for gas-check cups for 7-inch howitzer.

Two steel forgings for pressure gauges.

One gas-check cup forging for 3.2-inch steel field-gun.

One steel forging for spindle and head for 3.2-inch steel field-gun.

Five forgings for gas-check cups for 3.2-inch steel field-guns.

Steel forgings for breech mechanism of 8-inch and 10-inch steel rifles, viz, one hinge block, one segmental gear, and eighteen bolts.

Some of these forgings were accepted without test, the metal and treatment being satisfactory to the Department. So many of them as were tested showed the following results:

| Name of forging. | Number of specimen. | Position in which specimen was taken. | Elastic limit per square inch of original section. | Elongation per inch under strain at elastic limit. | Tensile strength per square inch of original section. | Elongation after rupture. | Reduction of area after rupture. | Specific gravity. | Hardness. |
|---|---|---|---|---|---|---|---|---|---|
| | | | *Pounds.* | *Inch.* | *Pounds.* | *Per ct.* | *Per ct.* | | |
| Gas-check cups for 5 and 7 inch guns. | 1 | Tangentially | 85,000 | .003000 | 145,250 | 11.00 | 23.9 | ........ | ..... |
| | 2 | ...do | 84,000 | .002850 | 145,400 | 10.00 | 23.9 | ........ | ..... |
| Pressure gauges | 2 | Longitudinally. | 62,000 | .002050 | 131,900 | 11.50 | 13.2 | 7.8389 | 26.51 |
| Gas-check cups for 3.2-inch field guns. | 3 | Tangentially | 75,000 | .002550 | 126,800 | 12.50 | 23.9 | ........ | ..... |

No new contracts for gun material have been made during the year, there having been no funds available for that purpose on account of the non-passage by Congress of any bill making appropriation for the armament of fortifications.

There has consequently been comparatively little to do at this place in the way of constant daily inspection work; the time available for other work has been well employed, it is thought, in the preparation of the first draught of specifications governing the manufacture of forgings for steel guns of all calibers; in completing the record of the manufacture of all the steel forgings which have been purchased by the Department, and in preparing the blank forms for future records. The draught of specifications has been submitted to you for such revision as may be deemed advisable or necessary; the experience of the Department and of this office during the past five years, as well as the information on file in the Ordnance Office, in respect to the requirements of other countries have all been considered in drawing up these specifications, while the strength and security of the built-up structures have been kept in mind. It is thought that under these specifications the United States will, with intelligent inspection of the manufacture, be reasonably certain to obtain reliable material for gun construction; that the guns themselves will possess sufficient strength and power, while at the same time steel manufacturers possessing a suitable plant will be able to fairly fill the specifications with very little difficulty and at a reasonable price. The amount of testing required has been reduced to a minimum.

F. E. HOBBS,
*Lieutenant, Ordnance Department, U. S. Army.*

The CHIEF OF ORDNANCE, U. S. ARMY,
*Washington, D. C.*

# APPENDIX 10.

## *REPORT ON THE MAXIM GUN.*

(2 plates.)

ORDNANCE BOARD, U. S. ARMY,
*New York Arsenal, June* 20, 1888.

SIR: In accordance with instructions contained in letter of March 1, 1888, from your office, to test the Maxim Machine Gun, the Board has the honour to submit the following report:

In company with Mr. Broderick Clote, a director of the Maxim Gun Company, the Board proceeded to the proving ground at Sandy Hook, where the operation of the gun was explained by Mr. Clote. The piece was then operated by him to substantiate the claim for its simplicity of construction, and the certainty and rapidity of its action. The cartridges used were made by the Winchester Repeating Arms Company and were furnished by the Maxim Gun Company. The supply having been exhausted, the gun was formally turned over to the Board for trial. With the gun tested by the company there was turned over another differing from it only in having a shorter barrel and being without a water jacket.

### DESCRIPTION.

This gun may properly be described as automatic, no force other than that of the recoil developed by the discharge being required for its complete operation, that is, for opening the breech, extracting the empty shell, withdrawing a cartridge from the belt in which the cartridges are delivered to the gun, cocking the piece, inserting the cartridge in the chamber, closing the breech, and placing a cartridge in position to be utilized at the next round. The first four operations are performed directly by the recoiling barrel and its connections, which, at the same time, place a heavy coiled spring under a strain of extension. The spring by its re-action returns the barrel to its original position and performs the last three of the above-mentioned operations. The barrel is screwed into a metal frame, which has a reciprocating motion in a rectangular casing inclosing the breech mechanism. The lock—which is also the breech-block—has a reciprocating motion in the frame independent of that of the latter in the casing. An eccentric crank is journaled in the sides of the frame near its rear. A link connects the crank with a fork, the branches of which are pivoted in the sides and near the front of the lock. When the breech is closed the link and fork are in the prolongation of the axis of the bore and the axes of crank and bore are in the same plane. The lock or breech-block is thus supported at the instant of fire. The crank extends clear through both sides of the casing and has a motion of translation in slots cut in its sides. Its left extremity terminates in an eccentric cam over which a small chain connecting with the spiral recoil spring is wound. The spring is attached at its front to the exterior of the casing. To the right extremity of the crank there is attached a curved arm or lever which, when the barrel and frame recoil, comes in contact with another lever firmly secured to the casing. The curvature of these levers is such as to cause the crank to rotate slowly at first, but with a gradually accelerated motion, and to wind up the chain at the left, thus putting a strain of extension on the recoil spring. This rotation of the crank depresses the link and with it the body of the fork. A rearward motion is at the same time communicated to the fork by which the lock is withdrawn from the face of the breech with an accelerated motion corresponding to that of the crank. A spring-stop on the side of the breech-casing limits the forward rotation of the crank-handle and by its elasticity causes the handle to rebound, thus relieving the recoil spring from the work of rotating it backward. Another stop combining with it the functions of a catch limits the rearward rotation of the handle and prevents it from rebounding to the front. This catch readily yields when the system recoils and leaves the crank free to rotate.

### THE LOCK.

The lock consists of a box or casing containing a tumbler, sear, mainspring and firing-pin and an additional or safety sear. The tumbler is a bent lever pivoted near its middle. The upper arm engages in a notch cut on the under surface of the firing-pin and serves as a retractor. By means of the other arm the lock is cocked as the rear end or body of the fork before referred to, which now performs the functions of a cocking-lever, comes in contact with it in its descent and rotates the tumbler until the nose of the sear drops into the notch on its face. This rotation of the tumbler at the same time retracts the firing-pin. The mainspring, is of the V pattern, one branch being somewhat shorter than the other. The longer branch enters a notch cut on the under surface of the firing-pin while the other bears against the tumbler.

The retraction of the firing-pin has the effect of compressing the mainspring, and the release of the tumbler by the sear causes the pin to move under the action of the spring. In order, however, that there may be no accidental explosion before the breech is closed a safety sear is provided. This sear is pivoted at its front above the firing-pin and is kept in contact with it by a flat spring. A shoulder on the upper surface of the pin comes in contact with a lug on the under surface of the sear. When the breech is completely closed the fork or cocking-lever is in line with the axis of the bore. Just before reaching this position it comes in contact with the lower surface of the safety sear and raises it so as to free the lug from the shoulder on the pin. The piece is then ready to be fired.

The trigger consists of a lever pivoted to the rear of the breech-casing and connected with a grooved slide at its bottom. A spiral spring connects the front end of the slide with the front of the casing and returns the slide to position when it has been withdrawn. When the trigger-lever is pressed in toward the casing the slide is drawn to the rear and the shoulder forming the front end of the groove comes in contact with the sear, which extends into the groove, and trips it. If the trigger-lever be held pressed in by the hand or by any attachment the firing is continuous.

The extractor, which is external to the casing of the lock and has a vertical sliding motion along its face, is an under cut or flanged slide of a width sufficient to take in the head of a cartridge. It is automatically operated by two bent levers pivoted near their centers to the sides of the lock. One arm of each lever engages in grooves cut on the exterior of the extractor. The other arms in the forward movement of the lock are depressed by arms on the fork at right angles to it, which strike against lugs on the interior of the breech-casing.

### THE FEED.

The cartridges are carried side by side in belts made of two pieces of water-proofed tapes riveted together, leaving spaces large enough for single cartridges. The belts in general resemble the service cartridge-belts, though they are longer, each containing 334 cartridges. They are carried automatically through the feed-box by a bell-crank lever, one arm of which engages in a notch cut in the upper surface of the left side of the sliding-frame near its junction with the barrel, while the other engages with a slide moving through the feed-box at right angles to the barrel, and provided with two fingers which, as the barrel recoils, move back and drop behind a cartridge. When the barrel is returned to its original position the slide moves forward and the fingers by bearing against the cartridge carry it forward, and with it the belt, until the cartridge is in position parallel to but above the axis of the bore. As the barrel completes its forward movement the extractor rises, its face sliding over the base of the cartridge and its under-cut grooves embracing the rim of the cartridge head. In the completion of its vertical motion a spring on the inside of the breech-casing enters a notch cut in the right side of the extractor and holds it in position. If the lock be now withdrawn, which can be done by means of a handle on the eccentric crank, the extractor will draw the cartridge from the belt. If a shell be in the chamber it will also be withdrawn. In its rearward motion the extractor is prevented from falling by two projecting arms which rest on guide-lugs on the inner sides of the breech-casing. Near the end of its backward motion the arms on the extractor pass over the lugs and the extractor falls, partly under the influence of gravity and partly under that of a light spring in the upper part of the breech-casing, through a distance equal to that of the axis of the cartridge in the belt above the axis of the barrel. Shell and cartridge are securely held in their relative positions by lugs, beveled on their upper edge, on springs attached to the rear face of the extractor, the lugs projecting through openings beyond its front face.

On the return of the block to its first position the cartridge enters the chamber and the empty shell the ejecting tube, the axis of which is as much below the axis of the barrel as that of the cartridge in the belt is above it.

On the completion of the forward movement of the block the extractor again rises, sliding over the head of the empty shell, which is now released, and along the head of the cartridge in the chamber, and engages with another in the belt which, unless the piece has been fired, must first be pulled forward by hand to bring the cartridge in position above the axis of the barrel.

### WATER JACKET.

For those guns intended for long-continued firing a water jacket is provided. This is a brass casing surrounding the barrel, except for a short distance from the muzzle, and provided with a stuffing-box at each end to admit of motion of the barrel without loss of water. The casing has a filling-hole, ordinarily closed by a screw-plug, near its rear end. A vent near the front end permits escape of steam whenever it is generated. In order that there may be no loss of water through the vent when firing at an angle of depression, a pipe is placed within and near the top of the casing, connected with this pipe, which extends the entire length of the casing, and at right angles to it there is another pipe leading to and closely fitting the vent. Openings are left at each end of the main pipe by which communication is made with the interior of the casing. Within this pipe there is a double-ended plunger. This, when the axis of the piece is other than horizontal, slides to the lower end of the pipe and closes the orifice. Steam but not water can then escape by the upper orifice.

A spiral spring surrounds that part of the barrel within the casing. It serves to hold the glands of the stuffing-boxes in position.

### TO OPERATE THE GUN.

To operate the gun, the end of the cartridge-belt is passed from right to left through the feed-box slide. The lock is then withdrawn by means of the crank-handle and the cartridge-belt pulled through until the first cartridge comes into position above the axis of the bore. The lock is then returned to position, when the extractor rises and engages with the first cartridge in the belt. The lock is again withdrawn, and with it this cartridge. The belt is then pulled forward until the second cartridge comes into position over the axis of the barrel. The lock is again returned to position, by which movement the first cartridge is carried forward into the chamber and the second is seized by the extractor. The piece may then be fired by pressing on the trigger-lever. If the firing is to be continuous the lever is held down.

Should a cartridge miss fire it may be drawn from the chamber by means of the crank-handle, but the belt should be pulled forward by hand until the next cartridge comes into position, since, as there would be no recoil, there could be no movement of the feed-box slide and consequently no movement of belt and cartridges.

Should it be necessary to remove the lock it may be done in a few seconds, as the cocking-lever is connected by an interrupted screw-thread with the link attached to the eccentric crank.

### TESTS OF THE GUN.

The gun not being adapted to the present service cartridge with 500-grain bullet, folded-head copper-case cartridges with 405-grain bullet were furnished the Board for the trial. On attempting to fire them it was found that they were not properly supported by the lock, and that they burst through the fold or swelled very badly at the head.

A few brass cartridges made in 1876 by the United States Cartridge Company, Lowell, Mass., being on hand, they were next tried. They appeared to vary in size, and in many instances entered the chamber with such difficulty as to stop the operation of the gun.

Solid-head copper-case cartridges with 405-grain bullet were then asked for by the Board. On trial it was found that they missed fire to the extent of about 8 per cent., due, it was thought, to the weakness of the main-spring, the service primer requiring a very heavy blow of the firing-pin to explode it.

In order that it might make a thorough test of the principle of the gun, the Board requested that a supply of the last-named cartridges, but primed with the Winchester primer, might be furnished. These cartridges having been received, the test was resumed, with the following results:

| Number of cartridges in belt. | Number fired. | Time. | Target. | Remarks. |
|---|---|---|---|---|
| | | *Seconds.* | | |
| 290 | 290 | 27.5 | Fired to sea. | Gun mounted on carriage. |
| 100 | 99 | 9.25 | | First cartridge missed fire. Struck by firing-pin near edge of primer. |
| 50 | 50 | 4.75 | | |
| 25 | 25 | .......... | | Fired singly. |
| 290 | 290 | 27.25 | | |
| 100 | 100 | 9.25 | | |
| | | | *Yards.* | |
| 334 | 37 | .......... | 1,000 | Sighting shots. Telephone not working satisfactorily, firing at this range was suspended. |
| | 71 | 6.75 | 200 | Lock caught and did not close breech. Cause not ascertained at time. |
| | 97 | 9.25 | 200 | Lock caught and did not close breach. Lock removed and mainspring pivot found loose and projecting beyond side face of lock to such an extent as to prevent lock sliding in its grooves in frame. Cause, breaking of small stay wire through outer end of pivot. |
| 334 | 20 | .......... | 1,000 | Sighting shots. Struck 20 yards short. Elevation used, 1,100 yards. |
| | 20 | .......... | 1,000 | Sighting shots. Struck 6 feet above and 20 feet to right of point aimed at. Elevation used, 1,200 yards. |
| | 20 | .......... | 1,000 | Sighting shots. One miss-fire. Struck below point aimed at. Elevation used 1,175 yards. Sight jarred down to 1,150 yards. |
| | 20 | .......... | 1,000 | Sighting shots. |
| 246<br>334 | 580 | .......... | 1,000 | An attempt was made to fire 580 rounds, noting accuracy and time, two belts being used. Box containing second belt was placed on ground outside of wheel, in order that no time should be lost in changing boxes. After 150 rounds one miss-fire. Cartridge thrown out by operating crank by hand. In feeding second belt two hitches occurred, owing to inability of feeding apparatus to raise long column of cartridges from ground, an operation for which the gun was not designed. Accuracy, owing to stops, etc., not particularly good. |
| 334 | 332 | .......... | 200 | All struck in rectangle 4 feet by 4 feet 3 inches. Two miss-fires. Last 242 rounds fired in 22 seconds. |
| 334 | 332 | .......... | Fired to sea. | Operation of gun checked at fortieth round by cartridge entering feed-box obliquely and preventing barrel from returning to firing position. Two miss-fires while firing remainder of cartridges in belt. |
| 334 | 334 | .......... | | Gun worked perfectly. |
| 334 | 334 | .......... | | One miss-fire. |

The guns having been sent for by the owners the tests were discontinued.

### ADVANTAGES OF THIS GUN.

As this gun works automatically but one man is required to control its operation. The mounting is of such a character as to admit of the gun being elevated or depressed and at the same time traversed from right to left, or the reverse.

This is not a feature peculiar to the Maxim gun, but is found in many of the machine guns in the United States service. The dirigibility of the latter, however, is somewhat affected by the power applied at the crank-handle to fire them, which is not the case with the Maxim gun.

By means of two handles at the rear of the breech-casing the firer can readily change the direction of the gun without removing his thumbs from the trigger-lever; that is, without stopping the firing.

The gun is light, compact, and not complicated in construction, considering the many functions it has to perform.

The one tested by the Board was somewhat imperfect in construction. The lock did not run true in its grooves in the frame, and consequently the primers were struck at the side instead of centrally, thus causing, in connection with the weakness of the main-spring, frequent miss-fires. If "hang-fires" occur no mishap results, as there can be no recoil and no opening of the breech until the discharge takes place.

### DISADVANTAGES.

The method of assembling the lock is objectionable. The pins with securing wires should be replaced by screws similar to that through the tumbler, except that the heads should be slotted clear across so as to avoid the use of a fork screw-driver. No means exist of showing whether the lock is cocked or not, and none are provided to throw it out of action. Unless the trigger be pulled after closing the breech the lock will remain cocked and the main-spring compressed.

If the gun be set aside in this condition for some time the spring may take a permanent set. This, it was thought, happened to the main-spring in one of the locks furnished with the gun.

Without presenting it as a material objection, it may be well to state that the system necessitates the use of solid-head cartridges, as the interval of time, about one-eleventh of a second, between successive shots is so short that the breech system begins to recoil and the shell to be withdrawn before the bullet has left the bore. The shell there forms, as it were, a continuation of the chamber, and has by its inherent strength to sustain the then existing pressure of the gas.

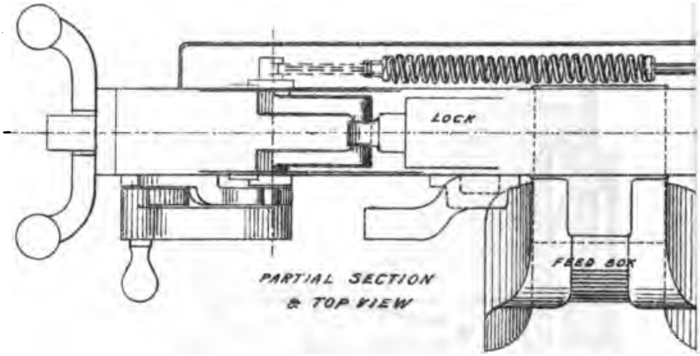
### CONCLUSION.

In view of the fact that this gun is compact, portable, not complicated in construction, easily directed, requires but few men for its service, is extremely rapid, and, so far as the limited trials indicate, certain in its action, the Board would respectfully recommend that one gun, adapted to the standard service ammunition, be procured for a more extended trial of the system, as the withdrawal of the gun before the Board sooner than was expected prevented the thorough and exhaustive test contemplated.

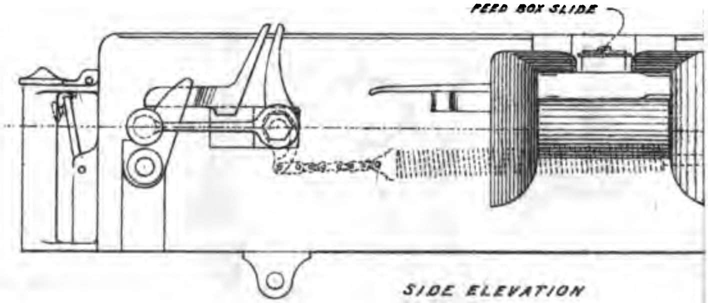
A. MORDECAI,
*Lieut. Colonel, Ordnance Dept., U. S. Army,*
*President of the Board.*
J. P. FARLEY,
*Major, Ordnance Dept., U. S. Army.*
JOHN E. GREER,
*Captain, Ordnance Dept., U. S. Army.*

The CHIEF OF ORDNANCE, U. S. ARMY,
*Washington, D. C.*

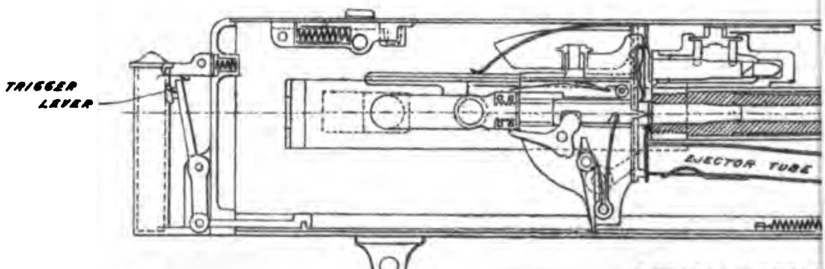
# THE MAXIM GUN



PARTIAL SECTION
& TOP VIEW



SIDE ELEVATION



VERTICAL SECTIO

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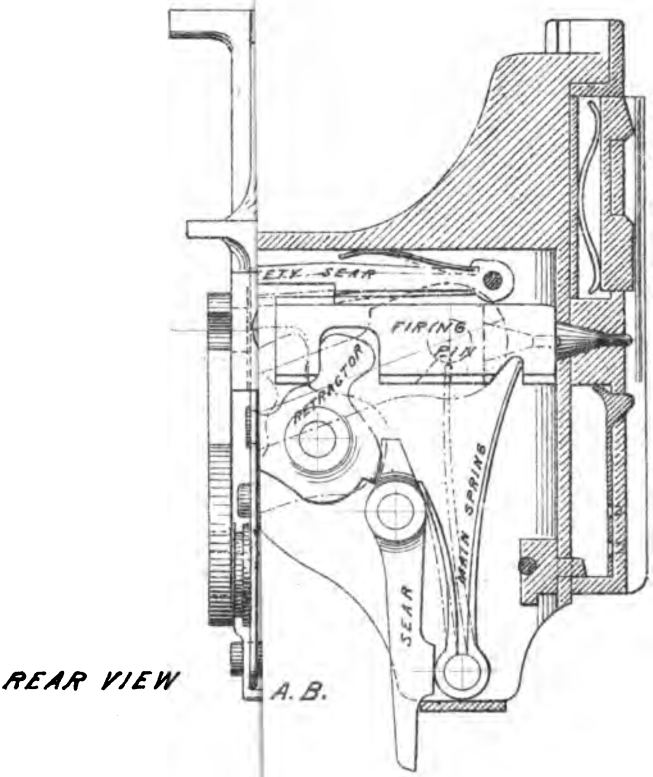
App

# PLATE II



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Appendix 10—1888.

# APPENDIX 11.

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## *DESCRIPTION OF AND INSTRUCTIONS FOR THE MANAGEMENT OF THE FIFTEEN-INCH SMOOTH-BORE GUN AND CARRIAGES, TABLE OF RANGES, DESCRIPTIVE PLATES, ETC.*

By the ORDNANCE BOARD U. S. ARMY.

(2 plates.)

### 15-INCH SMOOTH-BORE MUZZLE-LOADING GUN.

The gun is fully described in the Ordnance Manual for 1861, page 18.

#### PRINCIPAL DIMENSIONS.

| | | |
|---|---|---|
| Caliber | inches | 15 |
| Length of bore | do | 165 |
| Distance from face of muzzle to axis of trunnions | do | 120.45 |
| Total length of gun | do | 190 |
| Weight of gun | pounds | 49,099 |

No preponderance.

*The sights* are two in number, one placed on the breech and one on the upper surface of the piece in front of the trunnions.

The breech sight consists of a brass limb, secured by screws to the upper surface of the gun in a vertical plane through the axis of the bore, and at 55.55 inches from the axis of the trunnions, measured on a line parallel to the axis of the bore. It is 16.625 inches in height, and has a longitudinal slit with three holes 0.2 inch in diameter, one at each end of the slit and one at the middle point, with intervals of 2.25 inches between the sight holes.

The front sight is a single piece of brass fastened to the gun by two screws, its upper extremity terminating in a blade.

The elevations are given by means of an arc and index, the former attached to the base of the breech and the latter to the elevating fulcrum on the carriage.

*Projectiles.*—The shell is 14.85 inches in diameter. It has two ears at the extremities of a diameter at right angles to the axis of the fuse hole. Thickness of the shell, 2.5 inches.

The solid or cored shot is also provided in like manner with ears for the shell hooks.

Weight of shell, 330 pounds; weight of shot, 450 pounds.

*Charges* are of sphero-hexagonal powder, having a granulation of 100 to the pound and specific gravity of 1.800; the pressure with no charge to exceed 28,000 pounds per square inch.

Weight of full charge, 130 pounds.

*The paper time-fuses* are used with the water-capped, metallic fuse plug, or with the wooden fuse plug.

The implements and equipments required are as follows:

### IMPLEMENTS AND EQUIPMENTS.

*For service of gun.*

2 sponges.
2 rammers.
2 pass boxes.
2 carrying bars.
2 shell hooks.
1 gunner's pouch.
1 primer pouch.
2 lanyards.
2 thumbstalls.
2 priming wires.
1 water tub.
1 elevating bar.
1 tompion.
1 vent cover.
1 crane.
1 differential pulley (1,000 pounds).

To 6 pieces or less:

1 ladle.
1 worm.
2 gunner's gimlets.
1 gunner's pincers.
1 gunner's quadrant, brass.
2 vent punches.

*For service of carriage.*

4 maneuvering bars.
1 pinch bar.
1 retraction rope, ⅝-inch steel wire, 20 feet long.
1 set floor boards.

### TOOLS.

*For service of shells.*

1 Fuse plug extractor.
1 Fuse mallet.
1 Fuse setter, brass.
1 Fnse cutter, knife.
1 Fuse wrench, for water cap.
1 Fuse reamer, for wooden plug.

*For service of carriage.*

For 6 pieces or less:

1 screw wrench, large.
1 double wrench for 4½ and 3¼ inch nuts.
1 double wrench for 2 and 1⅝ inch United States standard nuts.
1 single wrench for 1½-inch old style nuts.
1 hammer, claw.

## ALTERED SEA-COAST CARRIAGES, MODEL 1883, WITH HYDRAULIC CYLINDERS, FOR 15-INCH GUN.

(2 plates.)

In order to strengthen the old 15-inch barbette carriage, that it may resist the strains caused by increasing the powder-charge of the gun to 130 pounds, and to adapt it to the 11-inch rifle, and also to facilitate its manipulation, the following alterations have been made:

### TOP CARRIAGE.

Inner braces have been inserted between the cheek-plates, to give additional stiffness.

A buffer-plate has been added to the front transom, to receive the shock caused by running the carriage into battery.

The number and strength of the transoms have been increased; the front and rear ones having guide-hooks attached to restrict the motion of the carriage on the chassis.

A heavy cross-head has been added to the rear transom, connected with the front and middle transoms by two cross-head braces. This cross-head, extending as it does below the line of the upper surface of the chassis rails, is so slotted that it may receive and retain the piston-rod of the hydraulic cylinder.

The front and rear of the cheek-plates have been extended by means of bronze plates, which act as boxes for the steel truck-wheels, the front ones working in journals and the rear ones on an eccentric axle; the system being so arranged that the carriage shall always move with rolling friction, except for a distance of about 6 inches from the front buffers; the eccentric axle permits rolling friction for the whole distance when it is desired.

For the old cast-iron elevating fulcrum there has been substituted one of wrought iron, arranged with steps for the convenience of the gunner, and also with an eye for attaching the pulley for the "retraction rope."

The additional alterations required for the carriages used with the 11-inch rifle are the trunnion-bed plates, made to receive the eccentric trunnion-rings attached to the gun, to overcome the preponderance, and the replacing of the elevating fulcrum by bronze elevating arcs and gears.

### CHASSIS.

Two kinds of chassis are altered. One with the narrow rail and the other with the deep rail. To make the chassis of equal height bracket bolsters are added to the narrow rails at the front, middle, and rear; the rear bracket bolster is deep enough to allow not only for the difference in depth of the two kinds of rails, but also to permit of the use of the old narrow-rail traverse wheels.

The other alterations of the chassis are common to the two carriages, and are the following:

The insertion of vertical braces between the plates of the rails to give additional stiffness.

The addition of an inclined rail on top of each rail of the chassis to cause an increasing resistance of the carriage when recoiling; and also to facilitate its running into battery.

The addition of an hydraulic cylinder, connected to the two rails by circular-bent straps, which also act as additional transoms.

This cylinder contains a piston-head perforated with four circular holes, three-quarters of an inch in diameter.

The piston-rod passes through a gland in the rear cylinder-head, and also through a slot in the cross-head, the end terminates in an eye, through which passes a steel pin, bearing two steel rollers to permit the easy adjustment of the piston-rod when the carriage ascends the inclined rails.

The addition of two buffer transoms, one attached to the front of the rails and the other to the rear, each being supplied with four rubber buffers to take up the shock when the carriage runs to the extreme limits of the rails.

To stiffen the rails of the chassis several transoms are added in rear of the hydraulic cylinder.

The addition of a wrought-iron prop and screw to the middle of each rail to permit of easy adjustment of the bearings due to a want of level of the platform.

Heavy wrought-iron bolsters are placed under the front of each rail. These bolsters are firmly bolted to the pintle transom and each rests on two conical rollers, which roll upon a plate on the platform, for ease and convenience of traversing.

The addition of a retraction apparatus placed at the rear end of the rails for the purpose of moving the carriage from battery. This con sists of a drum revolved by means of gearing, to which the retraction rope is attached.

The addition of a retaining apparatus, consisting of a pawl and lever, the pawl engaging the teeth of the rack on the top carriage. This is so arranged with a steel spring that in its normal condition it will always retain the top carriage at the point where it may be left by the recoil. By pulling the lever and releasing the pawl the carriage will, owing to the inclined rails, readily run into battery. The lever may be held back by means of a pin, and it would be well that this should be done when maneuvering the carriage by hand.

The crane has been transferred from the top carriage to the chassis rail, it being arranged so that it will be in a position to load when the carriage has recoiled to any point beyond 4 feet and 6 inches from the front, and 7 inches from the rear buffers.

For the better convenience of the cannoneers, side and rear platforms of wire netting are added.

### PRECAUTIONS TO BE OBSERVED.

The carriage is arranged to work almost automatically, but to do this it is necessary that care should be taken of its different parts.

The oil should always be poured in when the piston-rod is within the cylinder; not less than 25 gallons should be used when firing with full-powder charges.

The piston-rod should be kept free from rust in order that it may move freely.

There should be as little play as possible between the pintle transom and key-pin holding it in place, in order to avoid bending the transom.

The pintle rollers and all the wheel and axle journals should be kept well lubricated.

The carriage should be "in battery" when not in use, that the piston-rod may not be exposed to the weather.

The prop-screws should be given one-third of a turn before firing, just sufficient to clear them from the traverse circles.

As the loading crane operates best when the top carriage is 5 feet from the front buffers its position on the chassis should be observed.

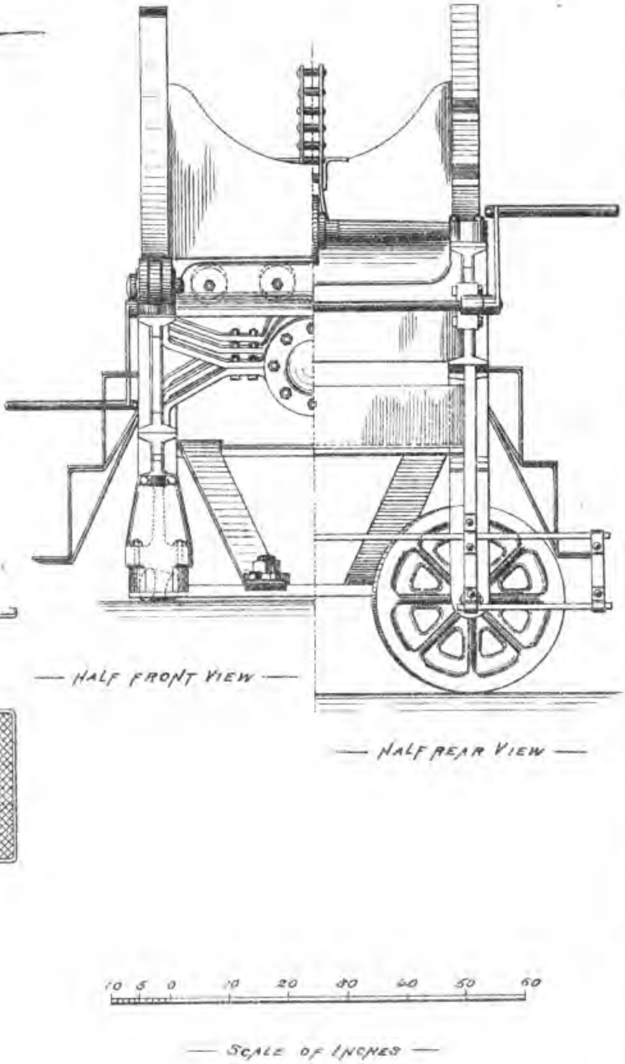
## *Range table.*

[Weight of shot, 455 pounds. Initial velocity, 1,706 feet. Powder charge, 130 pounds.]

| Distance of object. | Angle of— Elevation. | | Angle of— Fall. | | Remaining velocity. | Energy. | Penetration (unbacked wrought-iron). |
|---|---|---|---|---|---|---|---|
| *Yards.* | *Deg.* | *Min.* | *Deg.* | *Min.* | *Feet.* | *Foot-tons.* | *Inches.* |
| * 0 | ...... | ...... | ...... | ...... | .......... | .......... | .......... |
| 100 | ...... | ...... | ...... | 7 | 1,652 | 8,522 | 11.4 |
| 200 | ...... | 3 | ...... | 14 | 1,600 | 7,994 | 11.1 |
| 300 | ...... | 10 | ...... | 21 | 1,550 | 7,502 | 10.7 |
| 400 | ...... | 17 | ...... | 28 | 1,507 | 7,092 | 10.4 |
| 500 | ...... | 24 | ...... | 36 | 1,460 | 6,656 | 10.1 |
| 600 | ...... | 31 | ...... | 44 | 1,420 | 6,296 | 9.8 |
| 700 | ...... | 40 | ...... | 54 | 1,380 | 5,947 | 9.5 |
| 800 | ...... | 49 | 1 | 5 | 1,340 | 5,607 | 9.2 |
| 900 | ...... | 58 | 1 | 16 | 1,302 | 5,293 | 8.9 |
| 1,000 | 1 | 7 | 1 | 27 | 1,266 | 5,005 | 8.7 |
| 1,100 | 1 | 16 | 1 | 39 | 1,230 | 4,725 | 8.5 |
| 1,200 | 1 | 25 | 1 | 52 | 1,197 | 4,474 | 8.3 |
| 1,300 | 1 | 34 | 2 | 7 | 1,166 | 4,246 | 7.5 |
| 1,400 | 1 | 46 | 2 | 24 | 1,138 | 4,044 | 7.5 |
| 1,500 | 1 | 54 | 2 | 41 | 1,111 | 3,853 | 7.6 |
| 1,600 | 2 | 00 | 2 | 53 | 1,083 | 3,663 | 7.5 |
| 1,700 | 2 | 13 | 3 | 5 | 1,055 | 3,476 | 7.3 |
| 1,800 | 2 | 26 | 3 | 36 | 1,032 | 3,326 | 7.1 |
| 1,900 | 2 | 40 | 3 | 57 | 1,010 | 3,185 | 6.9 |
| 2,000 | 2 | 54 | 4 | 18 | 989 | 3,054 | 6.8 |
| 2,100 | 3 | 8 | 4 | 42 | 970 | 2,938 | 6.6 |
| 2,200 | 3 | 22 | 5 | 6 | 950 | 2,818 | 6.5 |
| 2,300 | 3 | 36 | 5 | 30 | 930 | 2,713 | 6.4 |
| 2,400 | 3 | 50 | 5 | 55 | 915 | 2,614 | 6.3 |
| 2,500 | 4 | 4 | 6 | 20 | 895 | 2,501 | 6.2 |
| 2,600 | 4 | 18 | 6 | 47 | 882 | 2,429 | 6.1 |
| 2,700 | 4 | 32 | 7 | 14 | 865 | 2,336 | 6.0 |
| 2,800 | 4 | 46 | 7 | 42 | 851 | 2,262 | 5.9 |
| 2,900 | 5 | 00 | 8 | 12 | 836 | 2,182 | 5.8 |
| 3,000 | 5 | 14 | 8 | 48 | 822 | 2,110 | 5.7 |
| 3,100 | 5 | 31 | 9 | 24 | 807 | 2,083 | 5.6 |
| 3,200 | 5 | 48 | 10 | 3 | 795 | 1,973 | 5.5 |
| 3,300 | 6 | 5 | 10 | 43 | 783 | 1,914 | 5.4 |
| 3,400 | 6 | 22 | 11 | 27 | 771 | 1,857 | 5.3 |
| 3,500 | 6 | 42 | 12 | 11 | 758 | 1,794 | 5.2 |
| 3,600 | 7 | 2 | 12 | 55 | 747 | 1,742 | 5.1 |
| 3,700 | 7 | 24 | 13 | 39 | 734 | 1,681 | 5.1 |
| 3,800 | 7 | 49 | 14 | 23 | 725 | 1,641 | 5.0 |
| 3,900 | 8 | 14 | 15 | 7 | 714 | 1,592 | 4.9 |
| 4,000 | 8 | 39 | 15 | 51 | 704 | 1,546 | 4.8 |
| 4,100 | 9 | 4 | 16 | 36 | 696 | 1,512 | 4.75 |
| 4,200 | 9 | 29 | 17 | 22 | 687 | 1,474 | 4.7 |
| 4,300 | 9 | 54 | 18 | 9 | 678 | 1,436 | 4.7 |
| 4,400 | 10 | 19 | 18 | 57 | 670 | 1,402 | 4.65 |
| 4,500 | 10 | 44 | 19 | 45 | 661 | 1,365 | 4.55 |
| 4,600 | 11 | 14 | 20 | 33 | 653 | 1,330 | 4.5 |
| 4,700 | 11 | 44 | 21 | 22 | 645 | 1,299 | 4.45 |
| 4,800 | 12 | 14 | 22 | 9 | 637 | 1,267 | 4.39 |
| 4,900 | 12 | 44 | 22 | 59 | 629 | 1,236 | 4.27 |
| 5,000 | 13 | 14 | 23 | 49 | 622 | 1,207 | 4.22 |
| 5,100 | 13 | 44 | 24 | 39 | 615 | 1,180 | 4.2 |
| 5,200 | 14 | 14 | 25 | 36 | 608 | 1,153 | 4.19 |
| 5,300 | 14 | 44 | 26 | 33 | 601 | 1,126 | 4.14 |
| 5,400 | 15 | 16 | 27 | 36 | 594 | 1,102 | 4.04 |
| 5,500 | 15 | 49 | 28 | 43 | 588 | 1,079 | 4.03 |
| 5,600 | 16 | 23 | 29 | 50 | 581 | 1,054 | 4.00 |
| 5,700 | 16 | 58 | 31 | 7 | 575 | 1,032 | 3.97 |
| 5,800 | 17 | 33 | 33 | 24 | 569 | 1,011 | 3.92 |
| 5,900 | 18 | 8 | 34 | 44 | 563 | 989 | 3.88 |
| 6,000 | 18 | 46 | 36 | 17 | 557 | 969 | 3.8 |

* Energy and penetration on basis of 450 pounds weight of projectiles.

# PLATE I.



Appendix 11—1888.

# APPENDIX 12.

## *INSPECTING GLASS FOR SPRINGFIELD RIFLES AND CARBINES.*

(1 plate.)

Fig. 1 is a perspective view from the front and above. Fig. 2, a longitudinal section through receiver and through the instrument when in a forward position, with a side view of breech-block. Fig. 3, a cross section through the receiver at the ejector-stud, with the instrument in rear position.

A brass frame, B, shaped to fit in the receiver A, holds a mirror, M, by which the bore can be viewed from the rear, or which illumines the bore for observation from the muzzle.

Portions of the brass frame at *t*, *t*, *t* are turned down to hold the mirror against the inclined face of a wooden block, W, concealed within the frame to stiffen it and prevent the crushing of the glass. The mirror does not extend quite to the top.

When the instrument is set well forward it is held between the breech-block, resting on the bar *b*, and the ejector-stud L, which supports the beveled face *l*.

A hole, H, in the bottom fits over the ejector-stud when the instrument is set well back, and the breech-block rests at *d* against the face *b*, holding the frame in place as before.

As at first designed, springs were to have been added to fit over the sides of the receiver and hold the frame in place, but this arrangement proved unnecessary. The springs are shown at S in Fig. 3.

This glass can also be used in inspecting the barrel of revolvers when the cylinder is removed.

A. H. RUSSELL,
*Captain, Ord. Dept., U. S. A.*

VANCOUVER BARRACKS ORDNANCE DEPOT,
*March* 30, 1886.

### DIRECTIONS FOR USE.

This instrument is designed to facilitate the inspection of chambers and bores of Springfield rifles and carbines.

For this purpose, raise the breech-block, place the mirror in the receiver in such a position that the ejector-stud shall fit in the hole on the under side of the mirror-frame, or that the lower rear corner of the frame shall be immediately in front of the ejector-stud, as may be found most convenient.

To examine the chamber and rear portion of bore, cause the light to pass down the bore from the muzzle, and look at the mirror in a direction perpendicular to the axis of the piece.

To examine the front portion of the bore, cause the reflected light from the mirror to pass up the bore, and look down from the muzzle.

NATIONAL ARMORY.
*Springfield, Mass., June* 30, 1886.

PLATE I.

# INSPECTING GLASS
## for SPRINGFIELD RIFLES and CARBINES

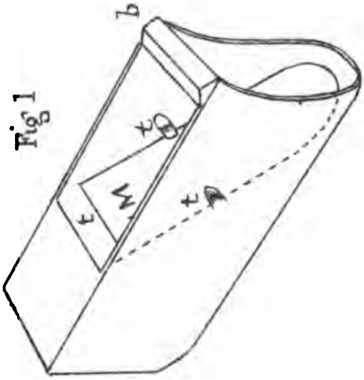


Fig. 1

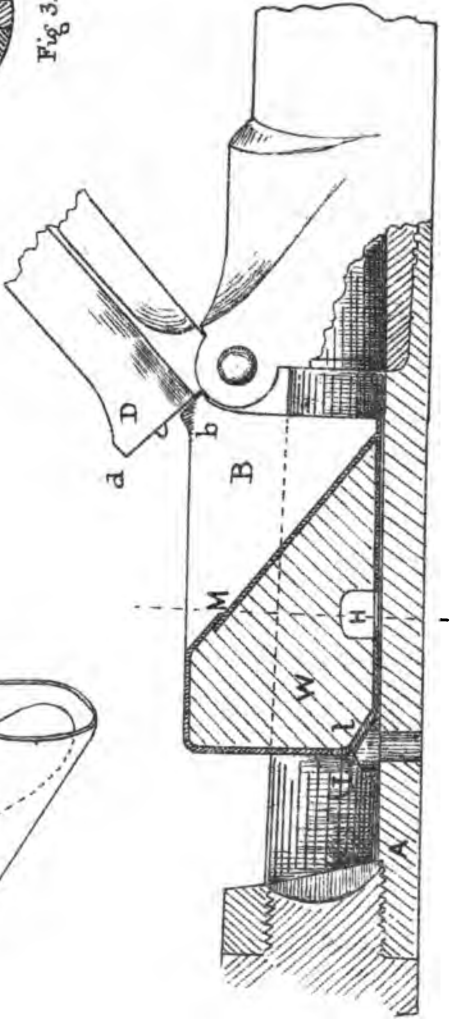


Fig. 2

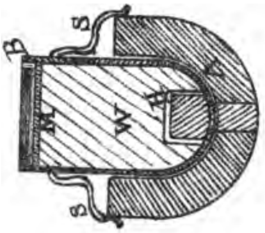


Fig. 3.

Ord50 2

Appendix 12—1888.

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